Communicable Disease Epidemiology Services
British Columbia Centre for Disease Control Society

Communicable Disease Report
British Columbia
1996

Marvin the Measle
Measles Campaign Mascot

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FOREWORD

The staff at Communicable Disease Epidemiology Services of BC Centre for Disease Control would like to thank every member of the public health field for their participation in communicable disease reporting and monitoring throughout the province. There is a long and continuing tradition of disease surveillance in British Columbia, upon which is based rapid identification of outbreaks, detection of emerging diseases, development of new CDC policies and innovative immunization programs, and evaluation and modification of existing control initiatives. Without continuing diligent prevention, detection, management and reporting of communicable diseases it would be impossible to maintain the current level of safety enjoyed by British Columbians.

So that we do not become complacent about surveillance and its effect on our communicable disease control activities, here is a reminder of some of the highlights of CD issues in the 1996 calendar year.

- an outbreak of *Salmonella* Newport associated with alfalfa sprouts
- an outbreak of Hepatitis A on Vancouver Island
- a province-wide second dose measles-rubella catch-up immunization blitz for preschoolers and school-aged children
- introduction of a routine second dose of MMR for children at 18 months of age
- unusually high reporting of malaria in travellers returning from Southeast Asia
- a new case of hantavirus
- several community-wide outbreaks of water-borne *Cryptosporidium* in the southern interior part of the province
- an elevated rate of pertussis in the Lower Mainland
- an outbreak of E. coli in BC and the western United States related to unpasteurised apple juice
- enhanced case by case surveillance of risk factors for Hepatitis A

Preventive initiatives in addition to the routine follow-up and reporting by health unit staff of a myriad of other diseases and organisms provide the basis of communicable disease control in the province.

Epidemiology Services of the British Columbia Centre for Disease Control coordinates a case by case passive disease surveillance system called the Communicable Disease Surveillance System (CDSS). The objectives of the CDSS are to collect electronically, store, and report communicable disease data from all Health Regions in the province. Case reports originate from physicians, hospitals, laboratories and institutions and are forwarded to the local health unit. Public health nurses, physicians and environmental health officers evaluate each one, determine the appropriate follow-up, and ensure reporting electronically to CDSS so that the provincial scope of disease impact can be

monitored and disease control actions implemented accordingly. Every link in the chain of communication and action is vital to the control of diseases in the province.

Thank you once again for your contribution to the disease control process.

Staff at Epidemiology Services, BCCDC, 1996

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AMOEBIASIS

Amoebiasis is an infection with the intestinal protozoan *Entamoeba histolytica*. About 90% of infections are asymptomatic, and the remaining 10% display a spectrum of clinical syndromes ranging from mild diarrhea to abscesses of the liver or other organs. *E.histolytica* is acquired by ingestion of cysts from fecally contaminated water, food, or hands, or through oral and anal sexual contact with an infected person. Food borne exposure can occur when food handlers are shedding cysts or food is grown in fecally contaminated soil, fertilizer or water.

There were 417 reported cases of amoebiasis in British Columbia during 1996. This resulted in a provincial reporting rate of 11 cases per 100,000 people, slightly higher than the rates for the preceding 4 years, but lower than rates for 1989 to 1991. Reporting rates in British Columbia have been consistently higher than the national reported rate over the past decade. British Columbia has had the highest report rate of all provinces since 1984.

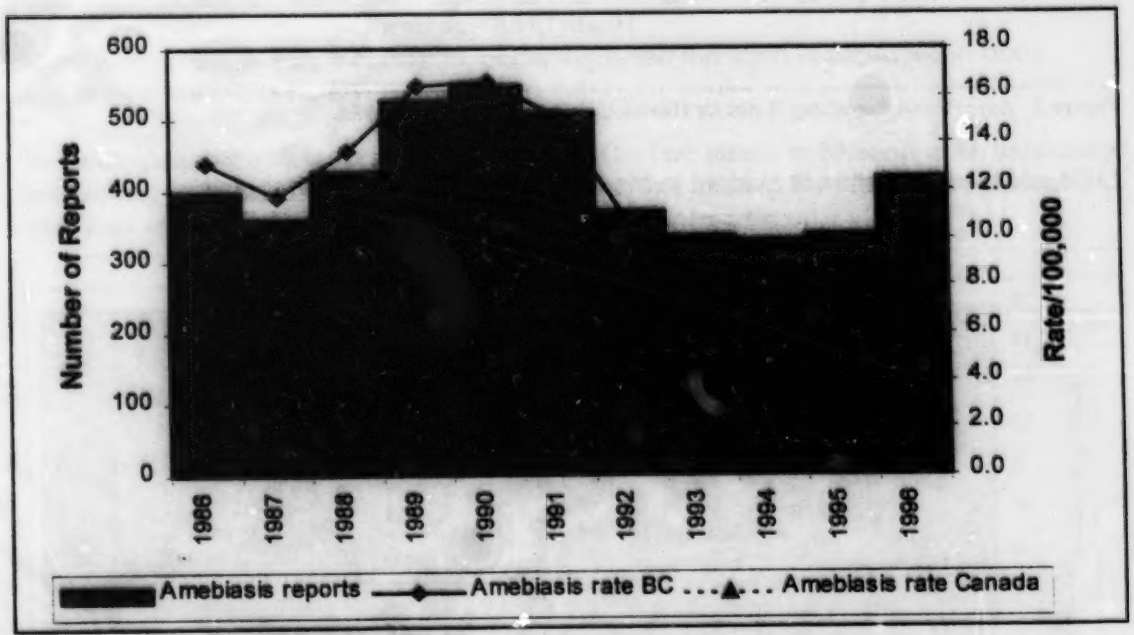


Figure 1. Reported Amoebiasis BC, 1986-96.

Among health units/departments, Vancouver had the highest rate of amoebiasis reporting in 1996 at 39 cases per 100,000 people. The Lower mainland area in general accounts for the majority of amoebiasis reports in British Columbia.

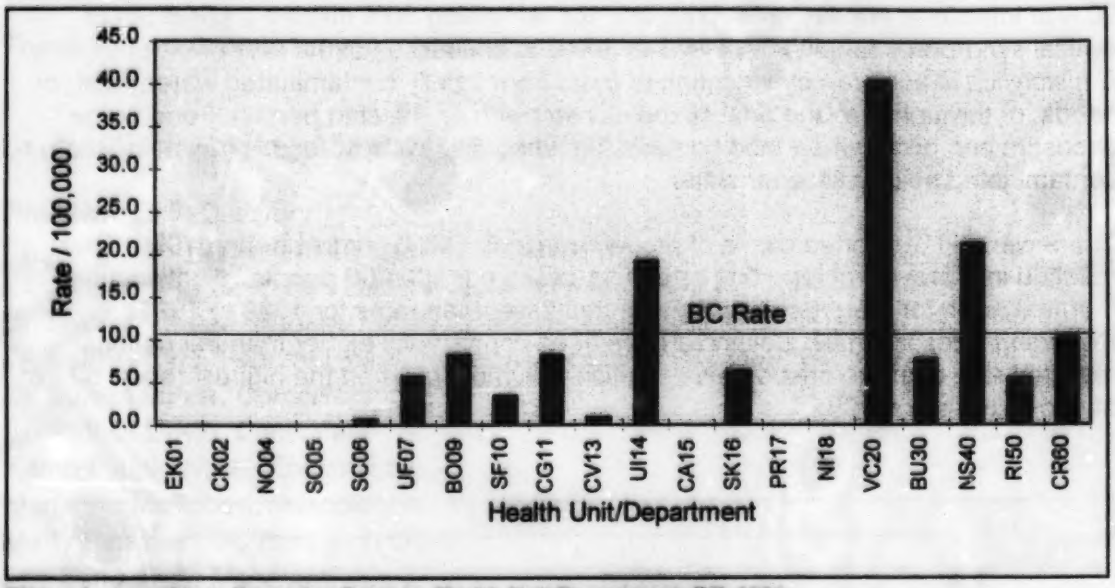


Figure 2. Amoebiasis Reporting Rates by Health Unit/Department, BC, 1996.

Little seasonal variation is evident in the reporting pattern for Amoebiasis.

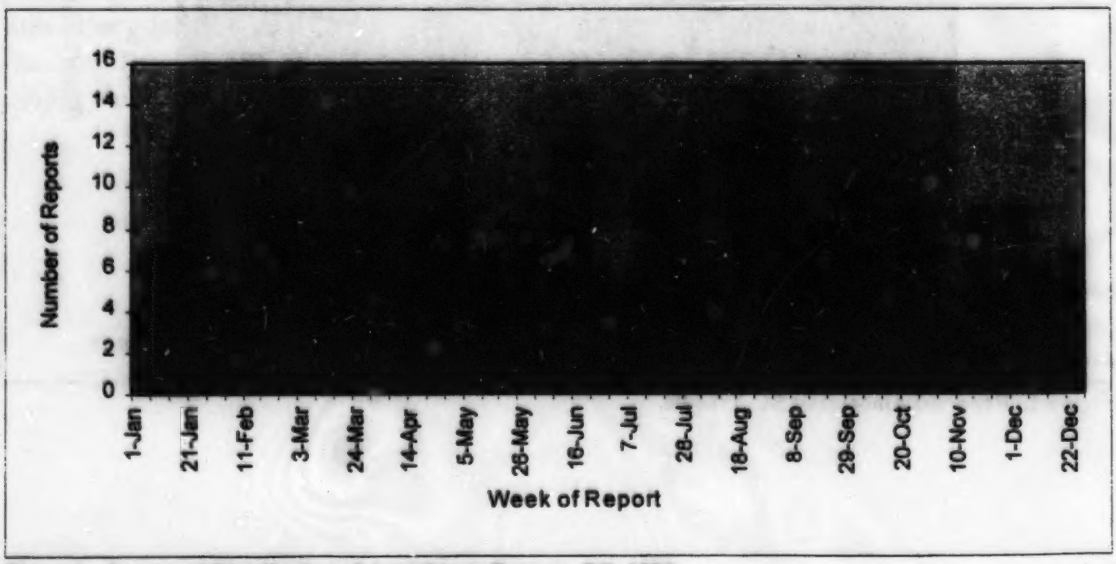


Figure3. Temporal Distribution of Amoebiasis Reports, BC, 1996.

BOTULISM

Spores of *the Clostridium botulinum* bacteria are found throughout the world in soil, marine sediments, agricultural products, and the intestinal tracts of animals. Neurotoxins produced by the bacterium cause three forms of botulism: Classical botulism; Infant botulism; and Wound botulism.

Classical botulism results from ingesting toxin that was produced by bacterial growth in contaminated food. Symptoms include weakness of the arms, legs and respiratory muscles, blurred vision, difficulty speaking and swallowing, and sometimes diarrhea. In severe cases there is respiratory paralysis requiring mechanical ventilation.

Infant botulism occurs when the organism colonizes the intestine and produces toxin. As its name indicates, infant botulism occurs almost exclusively in children under one year of age. Toxin or the organism can be detected in the stool. Symptoms usually begin with constipation followed by lethargy, difficulty swallowing and weakness. Raw honey consumption has been implicated in some but not all cases of infant botulism. Raw honey should not be fed to infants.

Wound botulism is a rare condition, occurring when the toxin is produced in body tissues, typically from a contaminated wound.

In 1996, there were 3 reports of botulism in B.C. Two cases in Skeena were associated with eating stink eggs (fermented fish eggs) and one case in the Upper Island Health Unit was associated with consumption of home canned salmon.

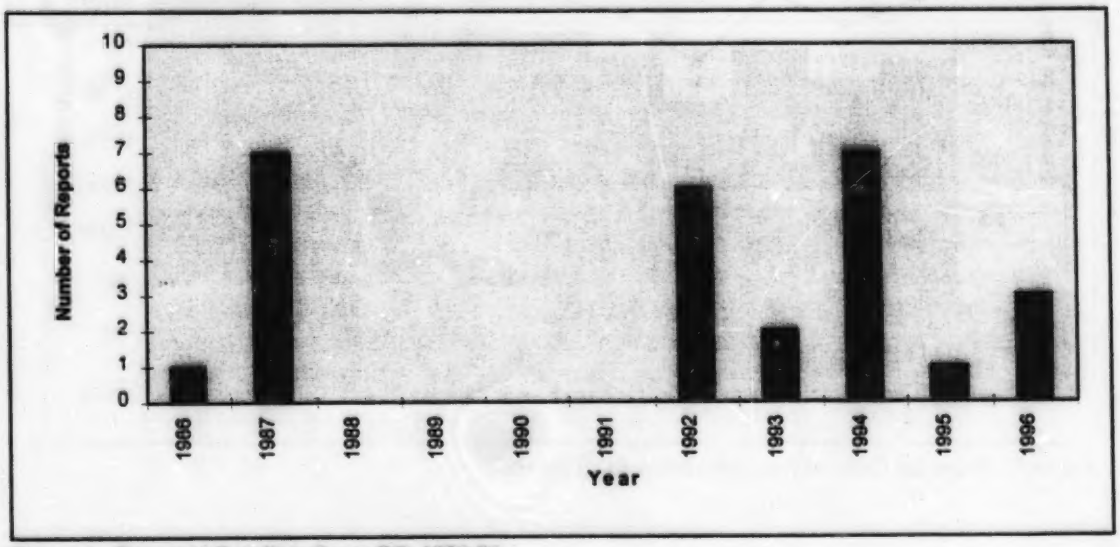


Figure 1. Reported Botulism Cases BC, 1986-96.

CAMPYLOBACTER ENTERITIS

Campylobacterosis is an acute bacterial disease of variable severity with symptoms including diarrhea, abdominal pain malaise, fever, nausea, and vomiting. The causal organisms are *Campylobacter jejuni* and less commonly *Campylobacter coli*. The illness is frequently over within 2-5 days and usually lasts no more than 10 days. Complications include a typhoid-like syndrome, reactive arthritis, and rarely febrile convulsions, Guillain-Barre syndrome, and meningitis.

Human infection may result from contact with animals (puppies, kittens, swine, sheep, rodents, birds) or through ingestion of animal products, unpasteurized milk, and cross contamination from poultry products, especially contaminated cutting boards. Person to person spread is rare.

In 1996, there were 2631 cases of *Campylobacter* cases reported for a Provincial rate of 67 cases per 100,000 people. Over the past 10 years, the reporting rate has varied from a low of 47 cases per 100,000 people in 1989 to a high of 86 cases per 100,000 in 1994. British Columbia reporting has been consistently higher than the national rate of *Campylobacter* reporting.

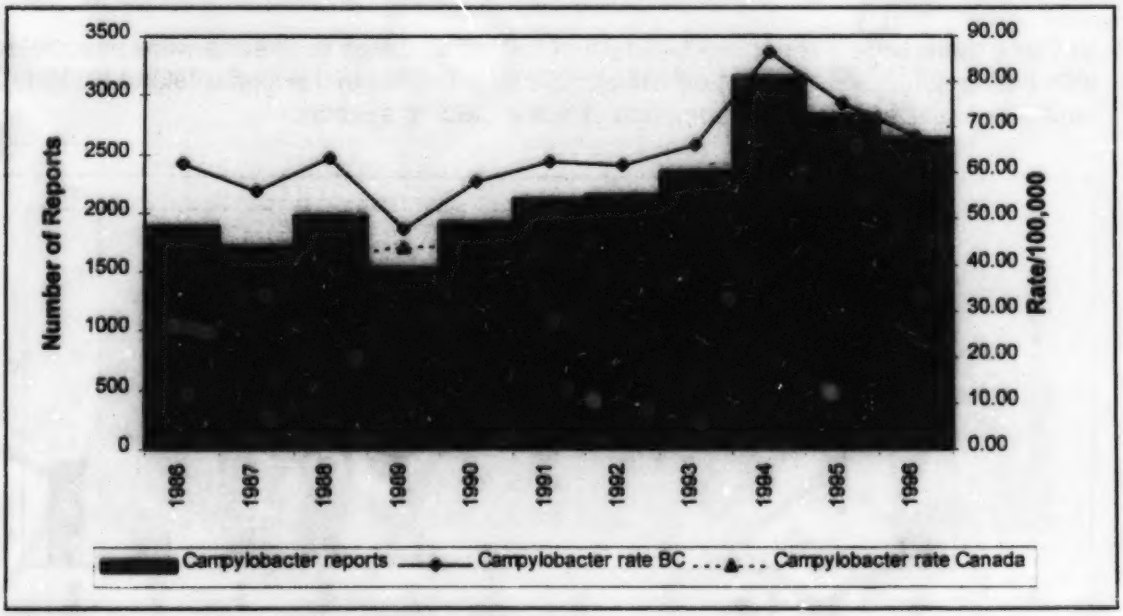


Figure 1. Reported Cases of Campylobacter, BC, 1986-96.

Within British Columbia, the rate of *Campylobacter* reporting by health unit/department ranged from a high of 94 reports per 100,000 people in the Upper Fraser Valley to a low of 22 per 100,000 in the Peace River area.

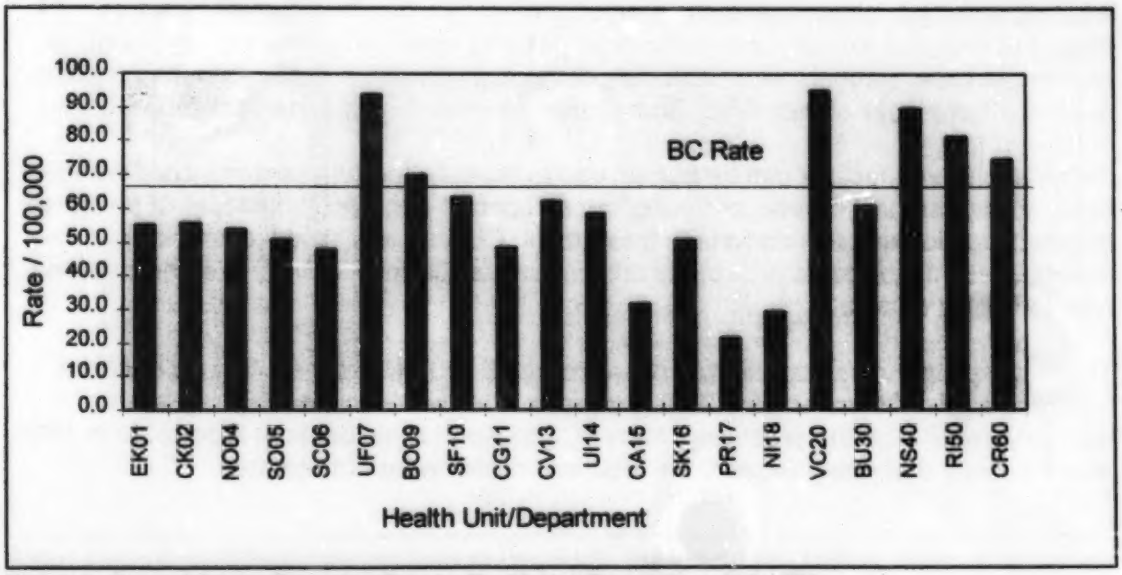
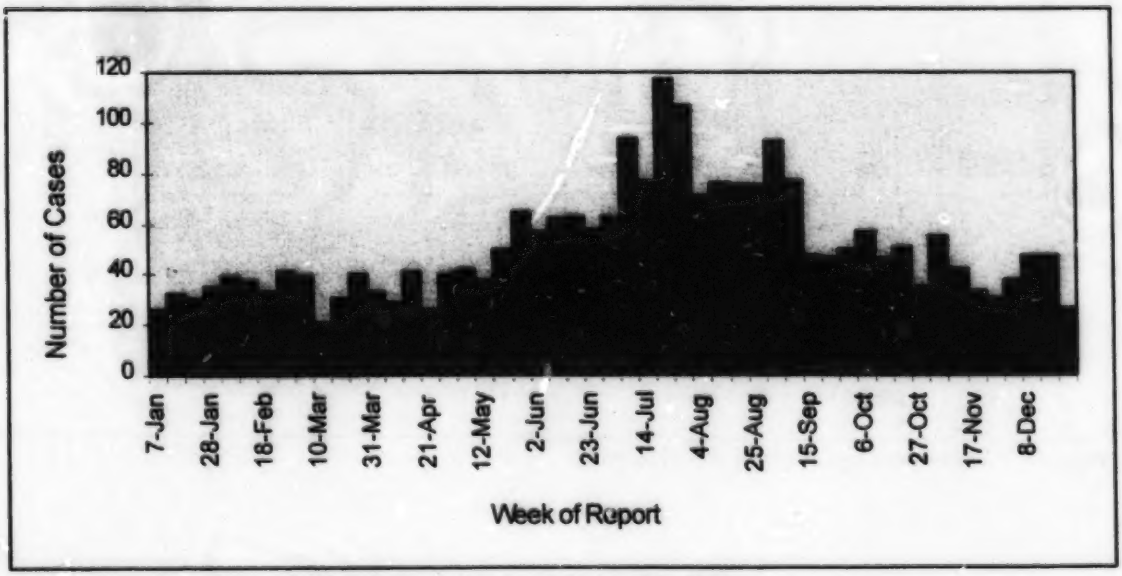


Figure 2. Campylobacter Reporting Rate by Health Unit/Department, BC, 1996.

Campylobacter reports peaked in the summer months with the majority of cases reported in June, July, and August.



.Figure 3. Temporal Distribution of Campylobacter Reports, BC, 1996.

CRYPTOSPORIDIOSIS

Cryptosporidium is a coccidian protozoan parasite which causes watery diarrhea, fever, nausea, vomiting, abdominal cramps and bloating. The diarrhea typically lasts 10 - 14 days, but may last longer. Less commonly, patients have complained of dry cough or bloody diarrhea. Patients with AIDS may develop prolonged symptoms lasting months or for the remainder of their lives. Some have developed multi-system complications.

Cryptosporidium oocysts can be transmitted to humans through contaminated water, food, or unpasteurized juice, or through close contact with infected people or animals. Infected individuals pass oocysts in their stools. Oocysts are highly resistant to chemical disinfectants used to purify drinking water. Boiling water for greater than one minute will kill oocysts.

There were 1294 cryptosporidiosis cases reported in 1996 representing a provincial reporting rate of 33 cases per 100,000 people. This was considerably higher than reporting rates from the preceding years. Cryptosporidiosis became reportable in 1995 and it is likely that many cases from 1994 and earlier were not reported.

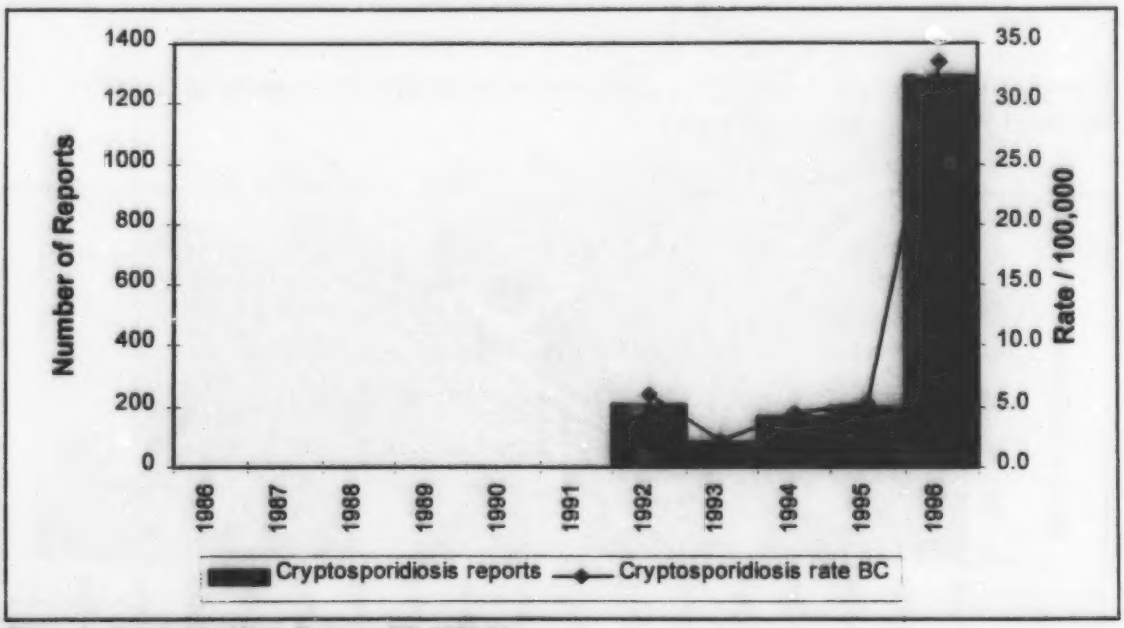


Figure 1. Cryptosporidium Reports, BC, 1986-96.

Health units in the south-central and south-eastern area of British Columbia had the highest reported incidence rate of cryptosporidiosis in 1996. There were large outbreaks in the cities of Cranbrook, Kelowna, Penticton, and Kamloops. These outbreaks account for much of the increased reporting during the year.

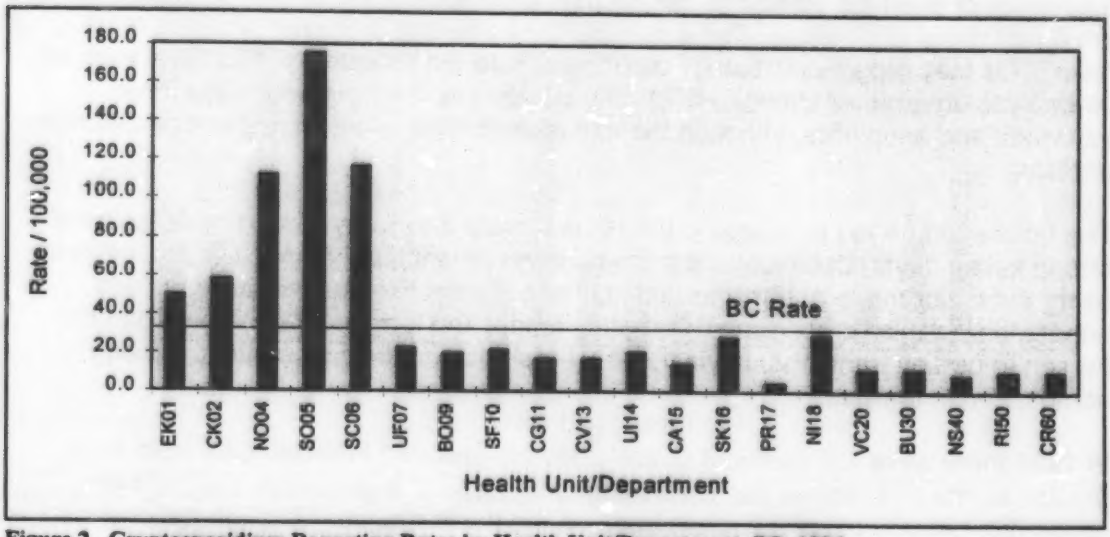


Figure 2. Cryptosporidium Reporting Rates by Health Unit/Department, BC, 1996.

During 1996, reporting was highest during the summer. The outbreaks in the above four cities occurred during the months of June, July, August and September.

Figure 3. Temporal Distribution of Cryptosporidium, BC, 1996.

ESCHERICHIA COLI O157:H7

E. coli O157:H7 is an enterohemorrhagic bacterial strain that has caused many epidemics of diarrhea. Infections can be asymptomatic but are usually characterized by an abrupt onset of diarrhea often accompanied by severe cramping and little or no fever. This may progress to bloody diarrhea or rare but serious complications such as haemolytic-uraemic syndrome (HUS). The infection is managed with supportive treatment and antibiotics, although the role of antibiotics in preventing complications is unclear.

The incubation period for *E. coli* O157:H7 is usually 3 to 5 days, but may range from one to seven days. Cattle are the primary reservoir with beef (especially ground beef) being the major mode of transmission. Other potential exposure sources include unpasteurized milk, cross contamination of foods, and farm products. There can be person to person transmission via the fecal-oral route in daycare centres, nursing homes, and in families.

In 1996 there were 138 cases of *E. coli* O157:H7 reported in British Columbia for a provincial rate of 4 reports per 100,000 people. Reporting peaked in 1989 at nearly 700 cases (20/100,000 people) but has been on the decline since. Although national data is limited, the British Columbia rate has been consistently above the national reporting rate.

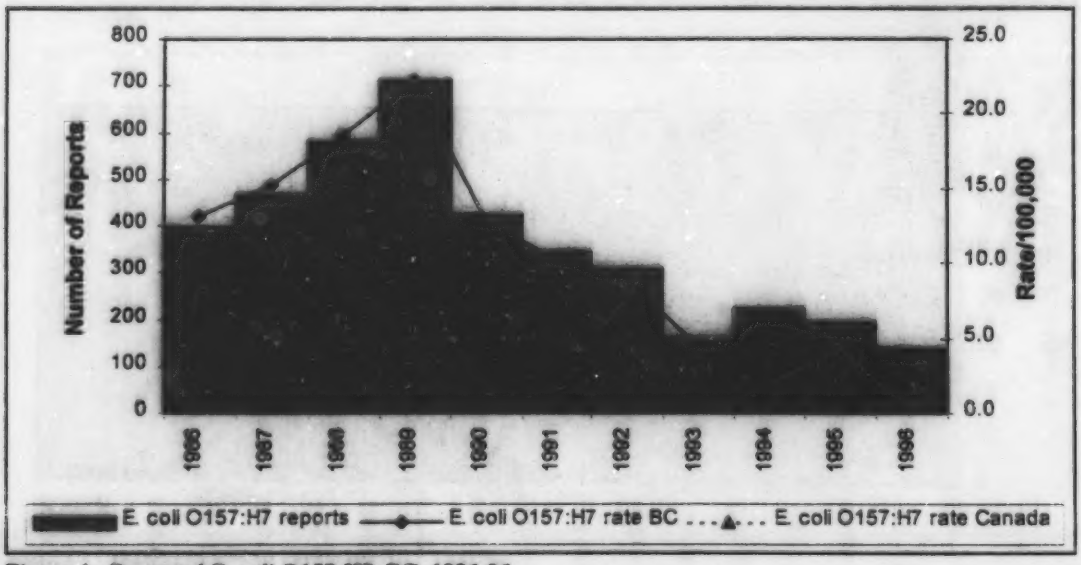


Figure 1. Reported E. coli O157:H7, BC, 1986-96.

Within British Columbia the rates of *E. coli* O157:H7 reporting were substantially higher than the provincial rate in the North Okanagan, Upper Fraser Valley, and Coast Garibaldi health units.

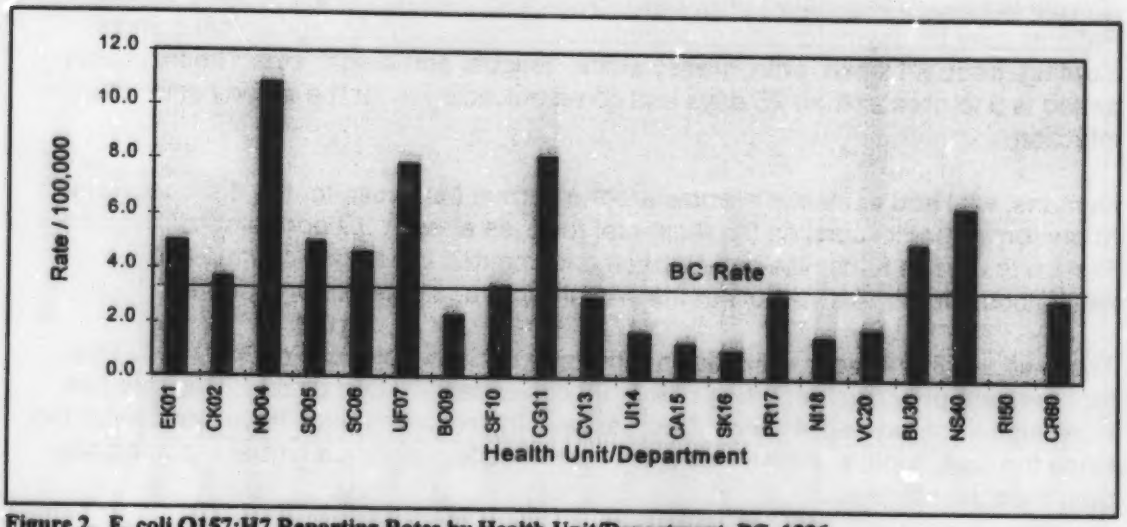


Figure 2. E. coli O157:H7 Reporting Rates by Health Unit/Department, BC, 1996.

In October of 1996, an outbreak of *E. coli* O157:H7 related to consumption of unpasteurized apple juice affected BC and the Western United States. At least nine cases in BC were related to this outbreak.

Reported case counts in British Columbia rose steadily beginning in late May and June and peaked in late August. This observed summer peak has been reported consistently throughout North America.

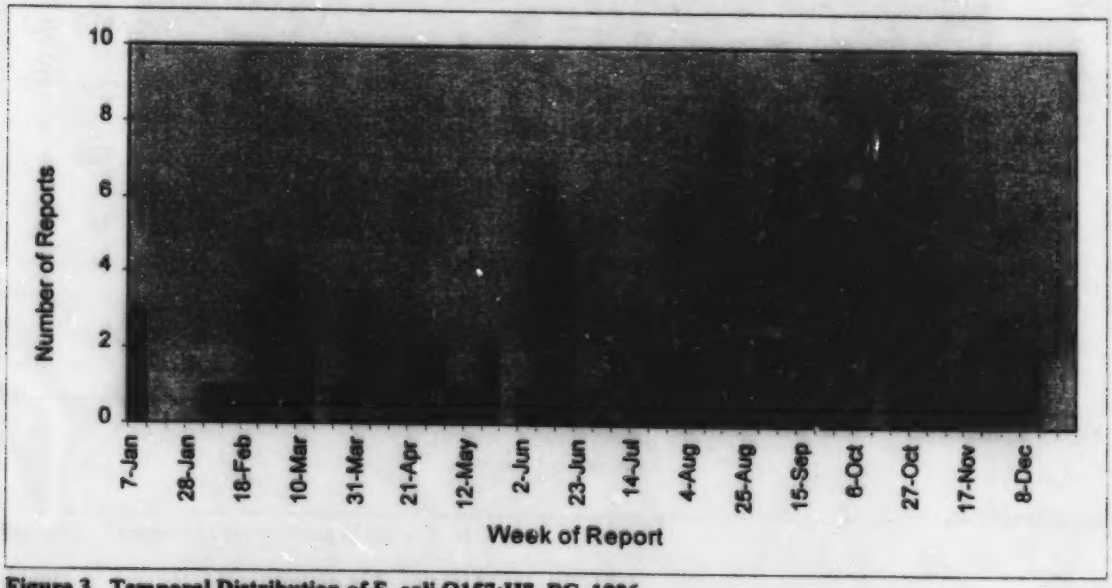


Figure 3. Temporal Distribution of E. coli O157:H7, BC, 1996.

GIARDIASIS

Giardia lamblia, a flagellated protozoan, causes an infection of the upper intestine. Patients may be asymptomatic or experience chronic diarrhea, abdominal cramps, bloating, frequent loose, pale, greasy stools, fatigue, and weight loss. The incubation period is 5 to greater than 25 days and communicability is for the entire period of infection.

Humans, wild and domestic animals are the normal reservoirs for the disease. Person to person spread occurs via the fecal-oral route as a result of poor personal hygiene. Person to person transmission has been documented in daycare centres and institutions. Outbreaks may occur from fecally contaminated water or food.

There were 1310 cases of giardiasis reported in British Columbia during 1996. This represents a provincial reporting rate of 33 cases per 100 000 people. This rate has been stable for the past 4 years. Decreases in the reporting rates have been recorded since the early 1990's. British Columbia continues to maintain a higher reporting rate than the national rate.

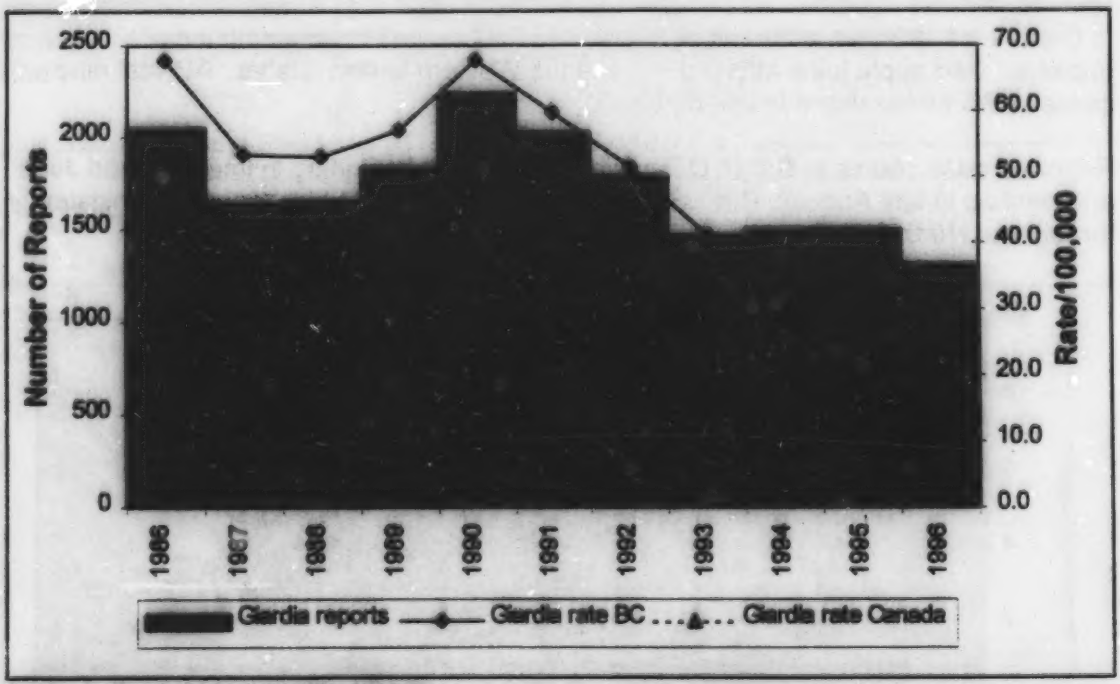


Figure 1. Reported Giardia, BC, 1986-96.

Coast Garibaldi and Vancouver health units/departments had the highest reported incidence rates of giardiasis in 1996.

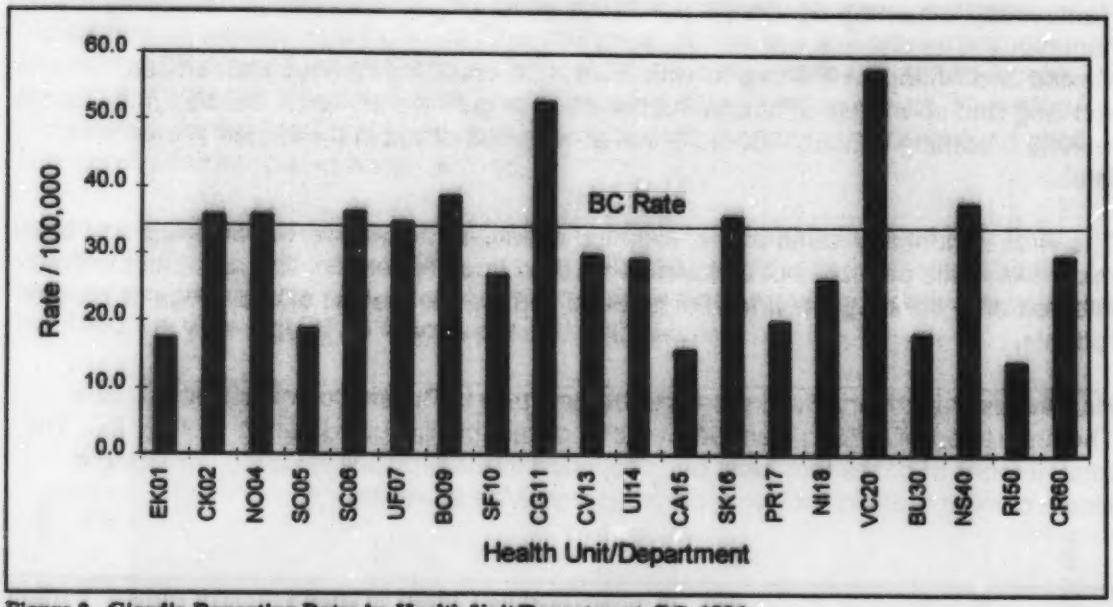


Figure 2. Giardia Reporting Rates by Health Unit/Department, BC, 1996.

Giardia infections are typically reported throughout the year in BC, with a peak during the late summer and early fall. This seasonal pattern was present in 1996.

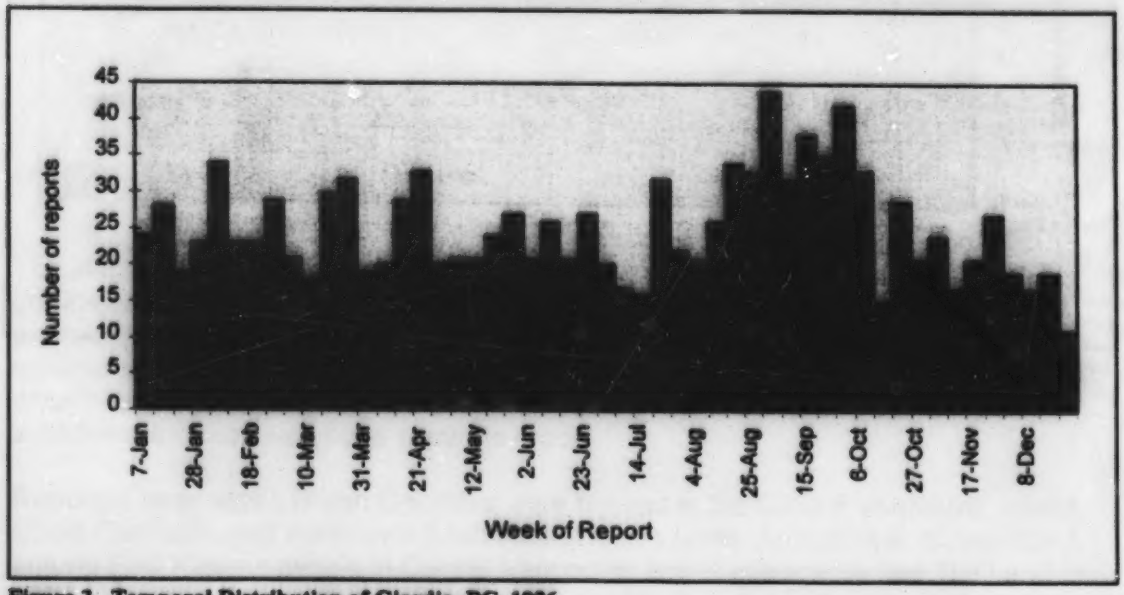


Figure 3. Temporal Distribution of Giardia, BC, 1996.

HANTAVIRUS

Hantavirus Pulmonary Syndrome (HPS) is a severe respiratory illness caused by hantavirus. The disease was first recognized in 1993 in the Four Corners area of New Mexico and Arizona. HPS begins with fever, sore muscles, headaches, nausea, vomiting and shortness of breath. As the disease gets worse, fluids build up in the lungs making breathing difficult. About 50% of all reported cases in the United States were fatal.

The virus is normally found only in rodents, especially deer mice, but also rats and other mice. Domestic pets are not believed to be a source of infection. Humans can become infected after inhaling the virus that is found in the urine, saliva, or droppings of infected rodents.

Hantavirus Pulmonary Syndrome is extremely rare in British Columbia and Canada. The first report of HPS in Canada was of 3 cases that occurred during 1994 in BC. The total number of cases that have been reported in the province is now 6, including a single case in 1996 in a 43 year old male from Vancouver Island.

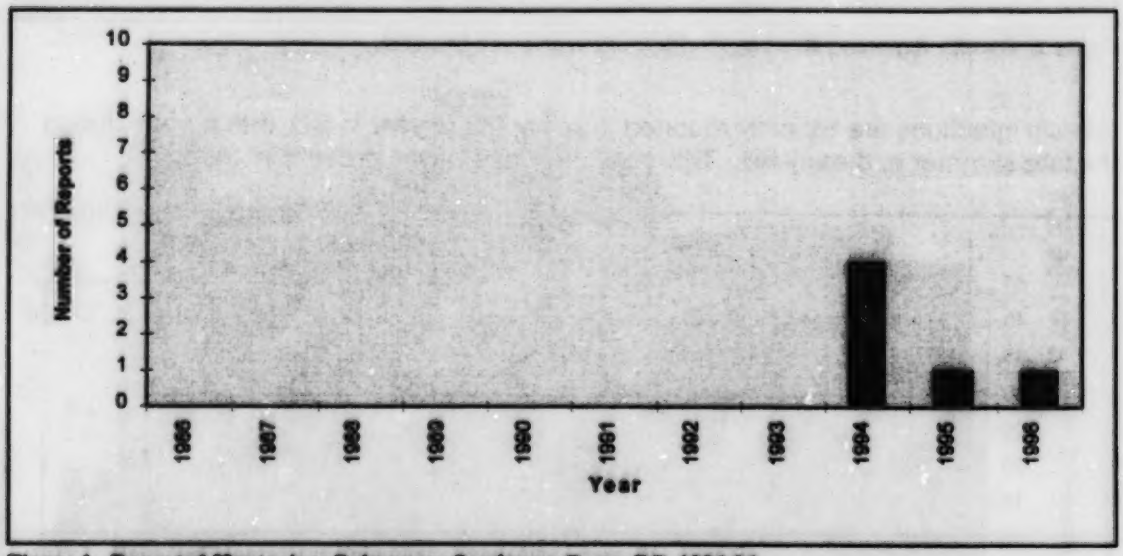


Figure 1. Reported Hantavirus Pulmonary Syndrome Cases, BC, 1986-96.

HEPATITIS A

Hepatitis A is a viral infection characterized by fever, malaise, anorexia, nausea, abdominal discomfort, and jaundice. The incubation period is 2 to 7 weeks with an average of 28 days. The virus is found at peak levels in the stools one to two weeks prior to the onset of symptoms, with levels declining after jaundice occurs. Hepatitis A is transmitted via the fecal-oral route, through consumption of raw or undercooked shell fish, fecally contaminated water, or food.

There were 490 reported cases of hepatitis A in British Columbia during 1996. This resulted in a provincial rate of 13 reports per 100,000 people. Although consistently higher than the national rate, annual provincial rates have remained relatively low since the 1992 ten year high of 29 reports per 100,000 people.

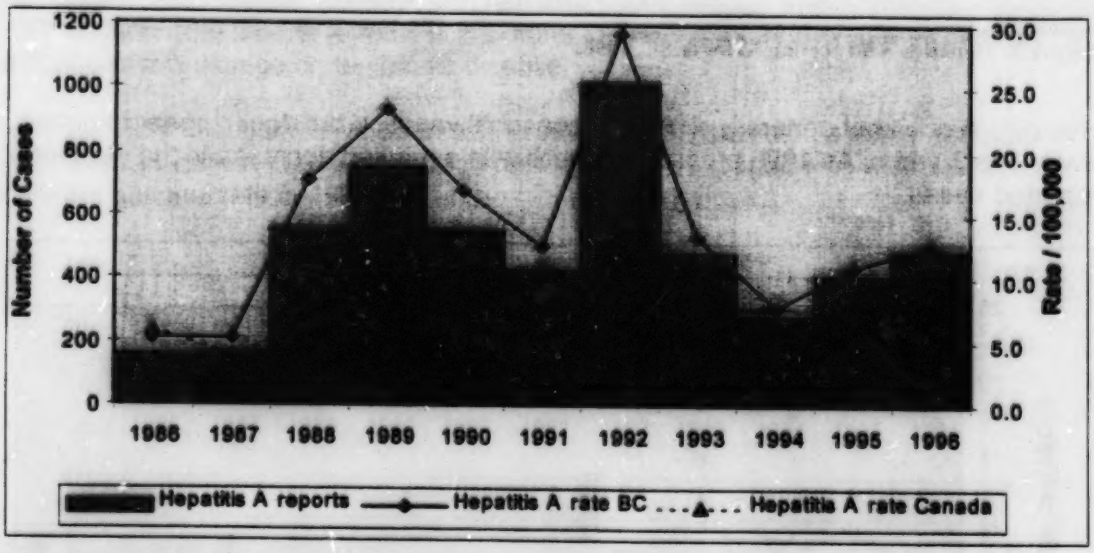


Figure 1. Report Hepatitis A in BC, 1986-1996.

The availability of new hepatitis A vaccines raised the question of which population groups are at risk of acquiring hepatitis A in British Columbia for the purpose of proposing enhanced use of publically funded hepatitis A vaccine. Throughout 1996, enhanced surveillance for Hepatitis A was conducted in each Health Region to determine the risk factors for infection. The results of this enhanced surveillance initiative will be circulated in a separate report.

Reported rates within British Columbia were highest in the Central Vancouver Island, Coast Garibaldi, and Vancouver health units/departments. An outbreak of hepatitis A among First Nations people in Central Vancouver Island occurred in late 1995 and early 1996. Hepatitis A vaccine was successfully used to limit this outbreak.

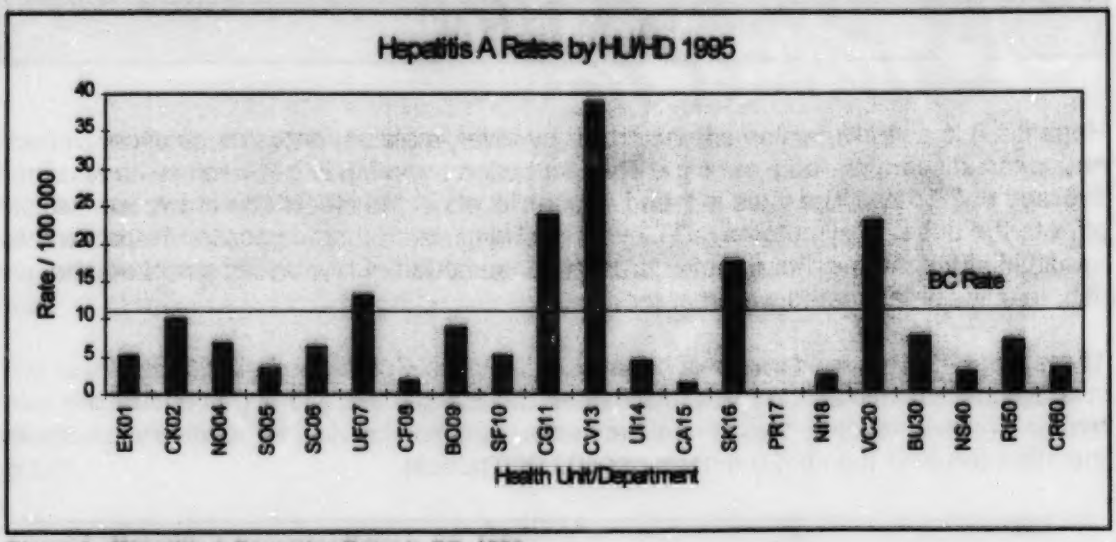


Figure 2. Hepatitis A Reporting Rates in BC, 1996.

Hepatitis A does not generally show any seasonal variation but does appear to peak every 5 to 7 years. As 1996 progressed there was a marked decrease in the number of reported cases.

Figure 3. Temporal Distribution of Hepatitis A, BC, 1996.

HEPATITIS B

Hepatitis B is a viral infection that can cause transient or chronic infections. Onset may be subtle with increasing anorexia, abdominal discomfort, nausea, vomiting, rash, and jaundice. Fever may be mild or absent. Many cases may be asymptomatic, especially in young children. The fatality rate in hospitalized patients is 1% with risk increasing with age. The prevalence of chronic hepatitis B in the North American population is 0.5%, however about 10% of all cases may go on to chronic hepatitis.

Transmission occurs by percutaneous or permucosal exposure to infective body fluids or vertically from mother to fetus. Percutaneous exposures that can result in infection include sharing needles during injection drug use, hemodialysis, acupuncture, tattooing, and needle stick injuries. Transmission can also occur through sexual activity. Transmission from mother to fetus is important to prevent as 90% of infants infected by vertical transmission go on to chronic disease.

Reported HBV infections have been on increasing in British Columbia over the past 10 years even as national rates have been declining. BC's reported rate was nearly 10 times the national rate in 1995.

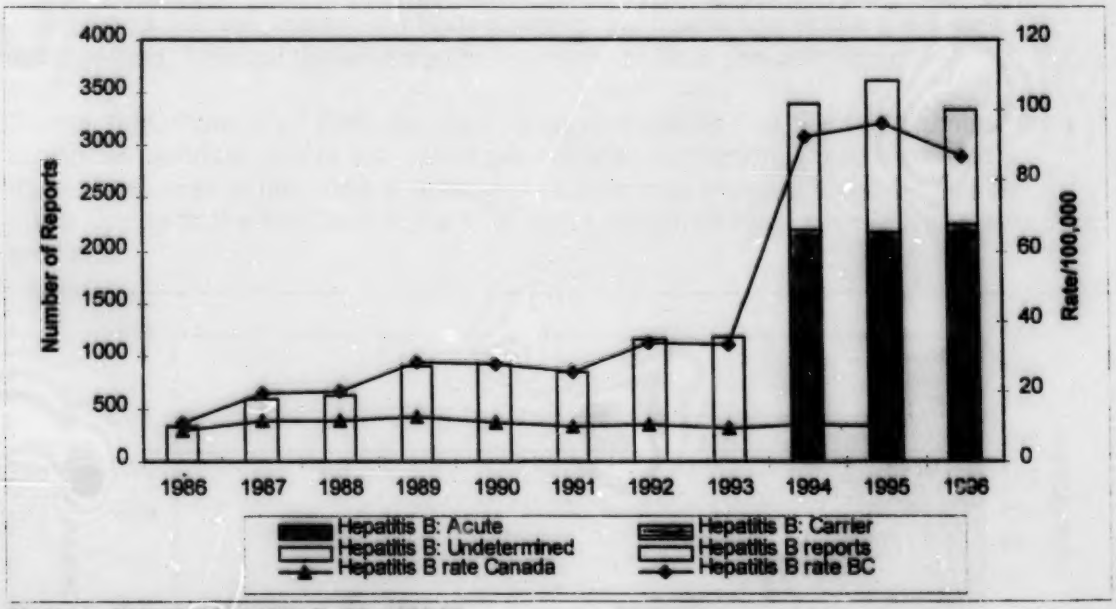


Figure 1. Reported Hepatitis B, BC, 1986-96.

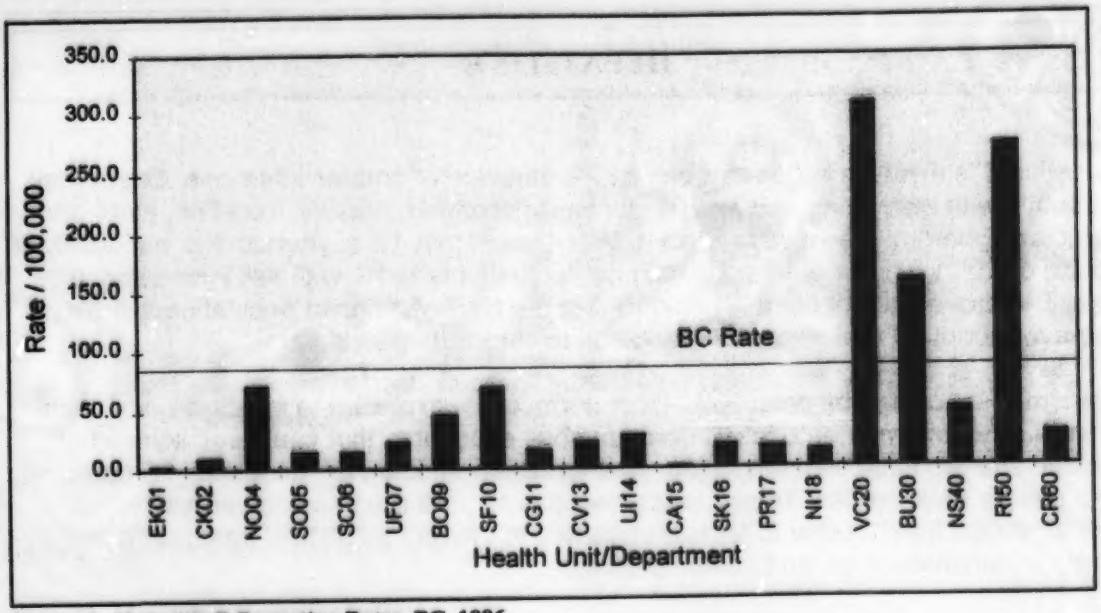


Figure 2. Hepatitis B Reporting Rates, BC, 1996.

HEPATITIS C

Hepatitis C is a viral infection of the liver which is transmitted parenterally. Acute infection with hepatitis C virus (HCV) is generally less severe than hepatitis B infection, but progresses more often to chronic disease. Fewer than 25% of newly infected persons develop symptoms which lead to a diagnosis of acute hepatitis C. As many as 90% of people newly infected with HCV continue to carry the virus and are infectious. These persons are at risk of becoming chronically ill at some time in the future as a result of continuing HCV infection. It is not known what proportion of these people will become chronically ill. The most serious sequelae of chronic HCV infection are cirrhosis and liver cancer. For those who develop sequelae, it has been estimated that it may take 10 years to develop symptoms of chronic HCV, 20 years to develop cirrhosis, and 30 or more years to develop liver cancer.

Symptoms may include anorexia, stomach discomfort, nausea, vomiting, and jaundice. Contaminated blood or plasma derivatives, needles and syringes are the main means by which the virus is spread. Injection drug users (IDU) are the highest risk group in Canada. Other higher risk groups include hemodialysis patients, and recipients of blood products prior to the HCV testing of these products in March 1990. Also at risk are health care workers who have frequent contact with hepatitis C infected blood, and sexual contacts of HCV positive persons. While transmission can also occur through needle-stick injuries, tattoo, and body piercing, the magnitude of risk is not well documented. Vertical transmission from mother to fetus can also occur.

During 1996 there were 6644 reported cases of Hepatitis C in British Columbia, for a provincial reporting rate of 172 cases per 100,000 population. There has been a marked increase in the number of reported cases over the past 3 years. This is primarily due to the look back/trace back initiatives which have been undertaken in the province.

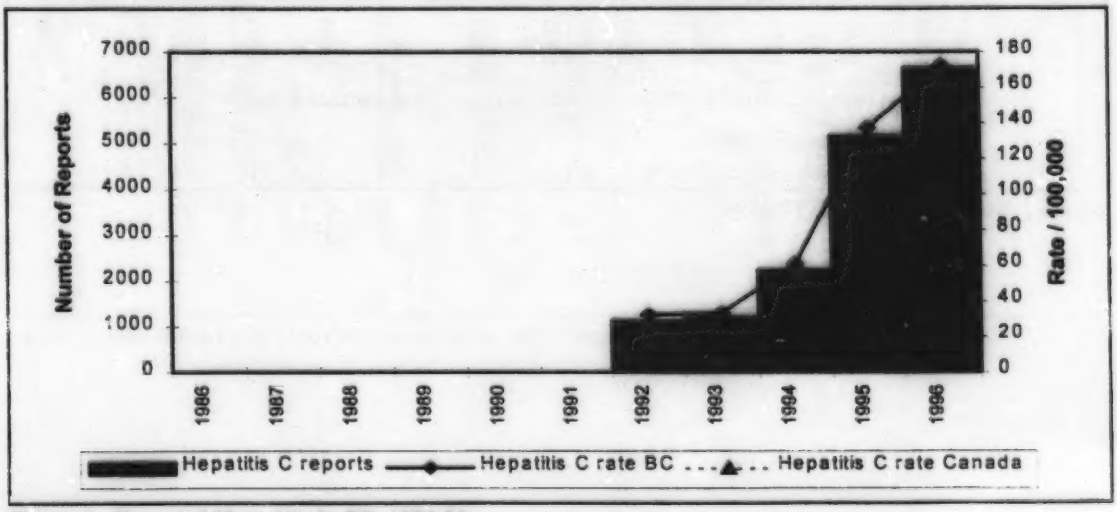


Figure 1. Reported Hepatitis C, BC, 1986-96.

HAEMOPHILUS INFLUENZAE TYPE B DISEASE

Invasive diseases caused by the bacterium *Haemophilus influenzae* type b (Hib) include meningitis, bacteremia, epiglottitis, and pneumonia. Of these diseases, meningitis is the most common, accounting for 55-65% of cases. Complications of Hib meningitis include hearing impairment and neurological sequelae. These complications will occur in 15-30% of Hib meningitis cases. Diagnosis of invasive Hib disease may be made by isolation of organism in blood, cerebrospinal fluid (CSF), synovial fluid, pleural fluid, a site normally sterile, or from the epiglottis.

In 1996 there were 12 reports of invasive Hib for an incidence rate of 0.31 reports per 100,000 population. The declining trend of Hib reporting has slowed over the past 4 years after a significant reduction in the number of reported cases following the introduction of the Hib conjugate vaccines in Canada in 1988.

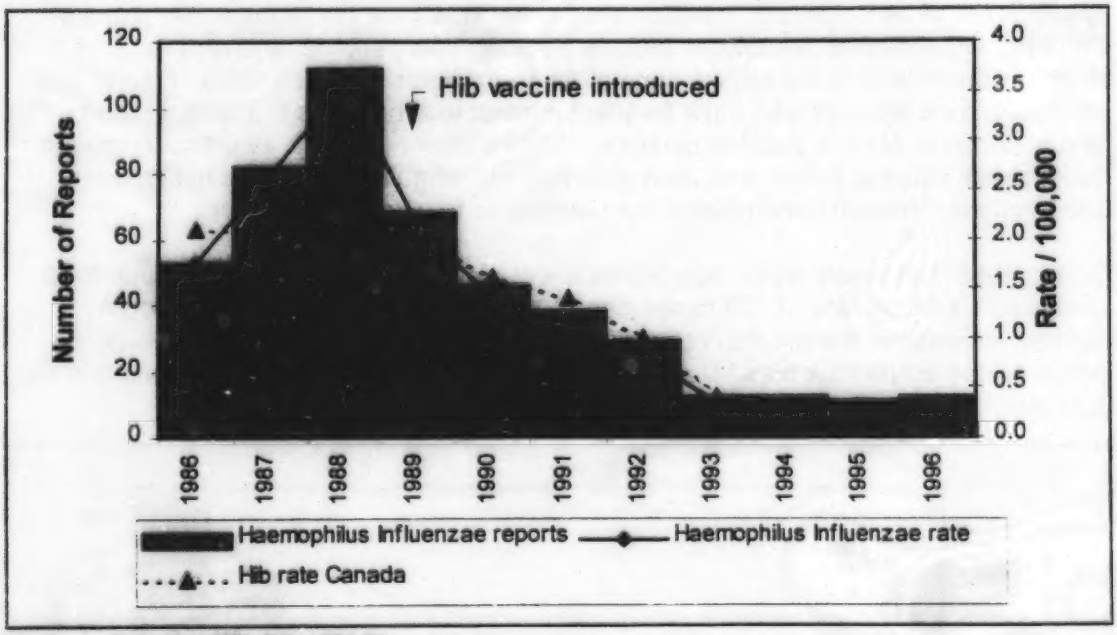


Figure 1. Reported Hib, BC, 1986-96.

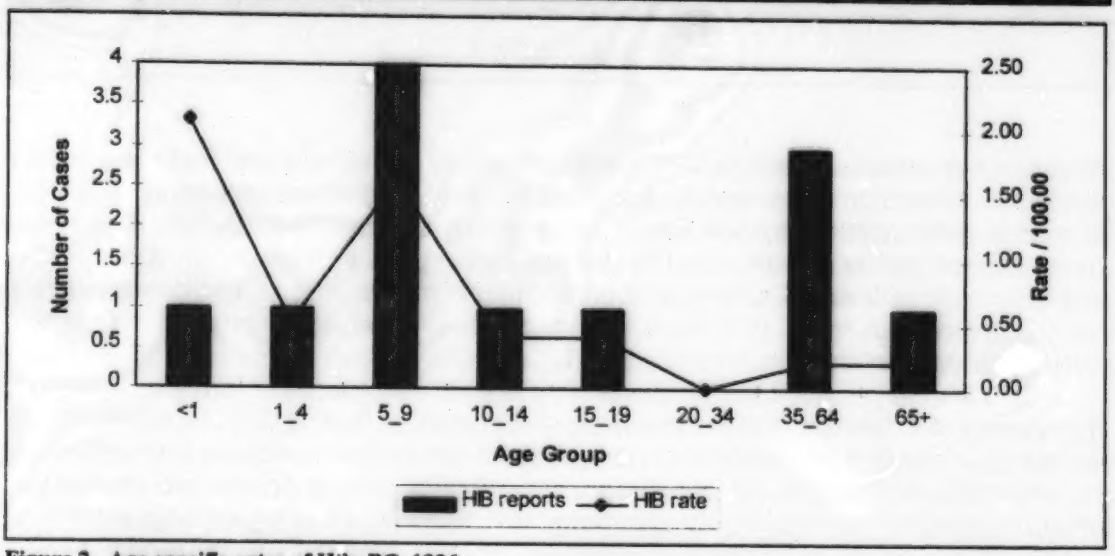


Figure 2. Age specific rates of Hib, BC, 1996.

Of the 12 cases reported in 1996, the highest rate occurred in infants under one year of age, but they contributed only one case of Hib disease. The second highest rate occurred in the 5-9 age category of which all the cases were 5 or 6 years.

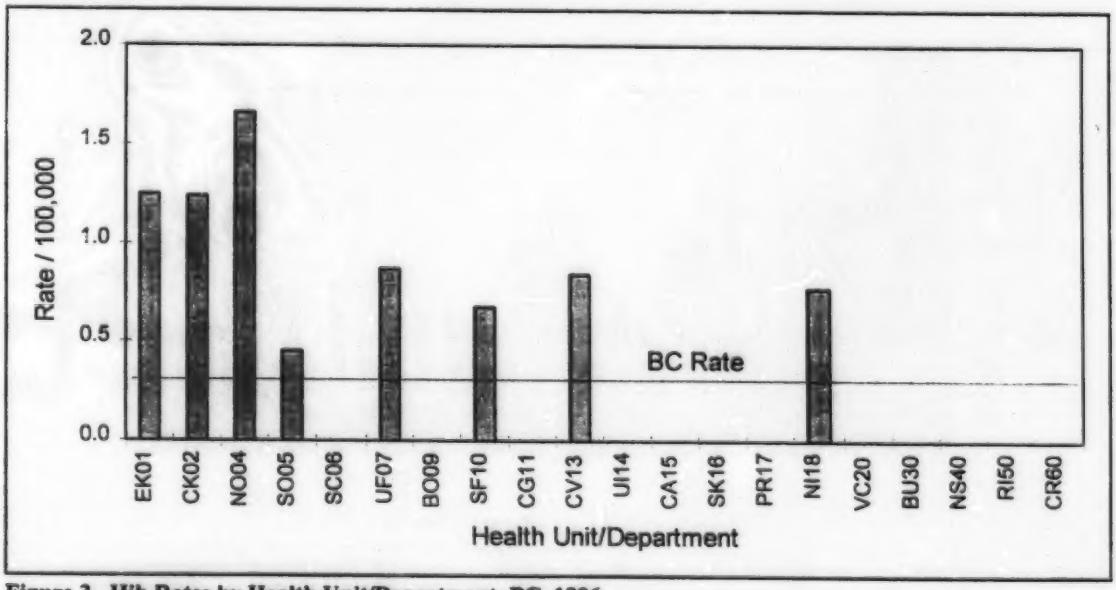


Figure 3. Hib Rates by Health Unit/Department, BC, 1996.

INFLUENZA

Influenza is an acute viral disease of the respiratory tract characterized by fever, headache, muscle pain, prostration, cough, sore throat, and nasal discharge. Gastrointestinal symptoms occur more often in young children than in adults. The illness may persist for 2-7 days and has an incubation period of 1-5 days. The virus is spread through airborne droplets, or through direct contact with virus particle which can live in dried mucous for up to 6 hours. Communicability in adults is usually 3 to 5 days and up to 7 days in children.

Three types of influenza viruses have been recognized: A, B, and C. Influenza A viruses are classified into subtypes on the basis of two surface antigens: hemagglutinin (H) and neuraminidase (N). Most widespread epidemics and pandemics are caused by Influenza A. Influenza B is usually associated with widespread or regional epidemics and type C has been associated with sporadic cases and minor localized outbreaks.

The BC Surveillance Program for Influenza Like Illness (ILI) relies on the BC Network of Sentinel Physicians, the Provincial Laboratory, and local health Units/Departments to report ILI and confirmed influenza cases. The percentage of patient visits to sentinel physicians attributable to ILI increased in December 1995 and continued into February 1996. The Provincial Lab confirmed 115 cases of influenza during the 1995/96 season.

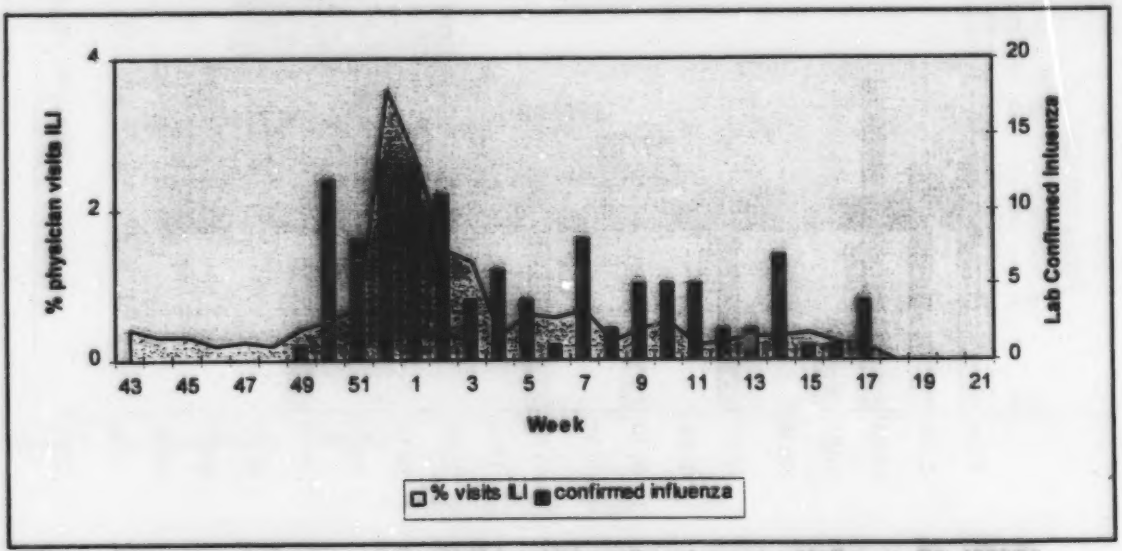


Figure 1. Percentage of physician visits with ILI and lab confirmed reports of Influenza, BC, 1995/96.

MALARIA

Malaria is a common and serious infection caused by four species of malaria parasites. The most serious malaria infection is falciparum malaria. All types of malaria are transmitted by the bite of an infected female Anopheles mosquito. Typical symptoms include cyclic fevers, sweats, chills, and headache. The incubation period varies by species, is generally 7 to 14 days, but may be as long as 8 to 10 months.

Malaria is not endemic in British Columbia. During 1996 there were 349 reported cases of malaria in British Columbia, resulting in a provincial rate of 9 cases per 100,000 people. Boundary Health Unit reported the highest rate of 36.7 per 100,000, followed by Upper Fraser Valley Health Unit with a rate of 19.6 per 100,000, and Vancouver Health Department with a rate of 10.5 per 100,000. The highest age-specific rate, 20.4 per 100,000, was reported in the 20 to 24 year age group. The 1996 rate for British Columbia is more than three times the 1994 rate of reporting. The main cause for this increase was determined to be increased travel to the Punjab area of India. This emphasizes the need for malaria chemoprophylaxis for all travellers to India. Consequently, initiatives have been undertaken to educate community physicians, and to translate pre-travel educational materials.

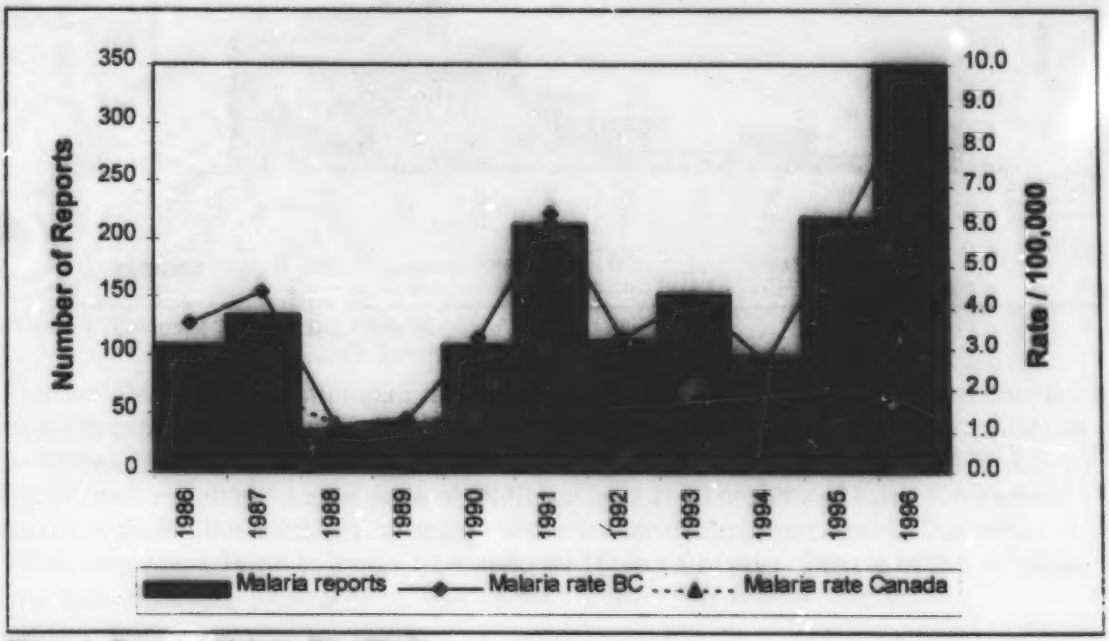


Figure 1. Reported Malaria, BC, 1986-96.

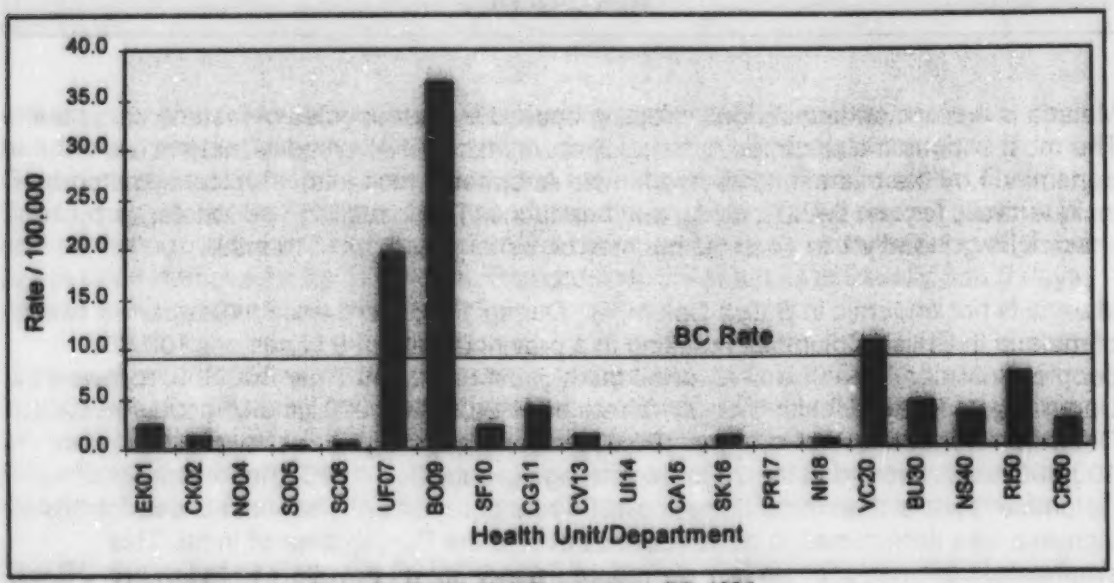


Figure 2. Malaria Reporting Rates by Health Unit/Department, BC, 1996.

MEASLES

Measles is an acute viral disease characterized by a prodromal fever, coryza, conjunctivitis, cough, Koplik spots, and a erythematous maculopapular rash. Typically the rash begins on the face then becomes generalized, lasting a total of 4-7 days. Complications of measles include otitis media, pneumonia, diarrhea, croup, and encephalitis. While measles is most severe in infants and adults, complications can occur in all age groups.

There were 40 cases of measles reported in British Columbia during 1996 for a provincial rate of 1.0 case per 100,000 people. The last measles outbreak in BC occurred in 1986 when British Columbia reported over 7000 cases. Approximately 95% of 2 year olds in BC are immunized against measles with one dose of MMR vaccine.

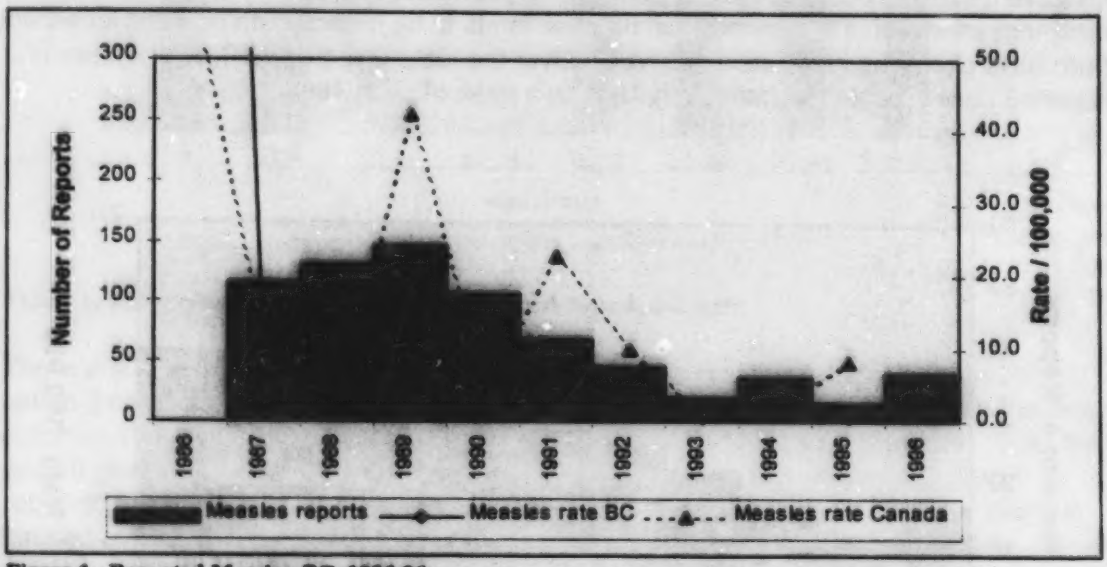


Figure 1. Reported Measles, BC, 1986-96.

Five to 10% of those immunized with a single dose of measles-containing vaccine fail to develop protective immunity. In 1995, Canada with only 3.6 % of the population in the Americas, accounted for 36% of the measles cases. Accordingly, in April 1996, BC introduced a routine second dose of MMR vaccine at 18 months of age. A measles-rubella vaccination catch-up campaign was also conducted from April to December 1996, and was offered to those 19 months to 18 years of age. Details of this initiative are reported in the Special Initiatives section of the 1996 Annual Report.

INVASIVE MENINGOCOCCAL DISEASE

Meningococcal disease is an infection caused by the bacterium *Neisseria meningitidis*. About 5-10% of the population carry this bacterium in their nasopharynx and remain asymptomatic. A small percentage of people infected will develop invasive disease, such as meningitis or septicaemia. The characteristic signs and symptoms of invasive meningococcal disease are a sudden onset of fever, vomiting and headache, with a stiff neck in cases of meningitis and/or purplish, petechial rash in cases of meningococcemia. In fulminant cases, shock, coma and death can occur within hours, even with antibiotic treatment. The overall case-fatality rate in Canada is about 10%.

Virtually all cases of invasive meningococcal disease are hospitalized, and therefore the majority of cases are identified and reported in BC. In 1996, there were 40 cases of invasive meningococcal disease reported for a provincial rate of 1.0 per 100,000. The incidence of invasive meningococcal disease tends to be cyclical with periodic localized outbreaks occurring at irregular intervals. Over the last 10 years in BC, the number of reported cases increased from 12 in 1987 to a peak of 57 in 1993.

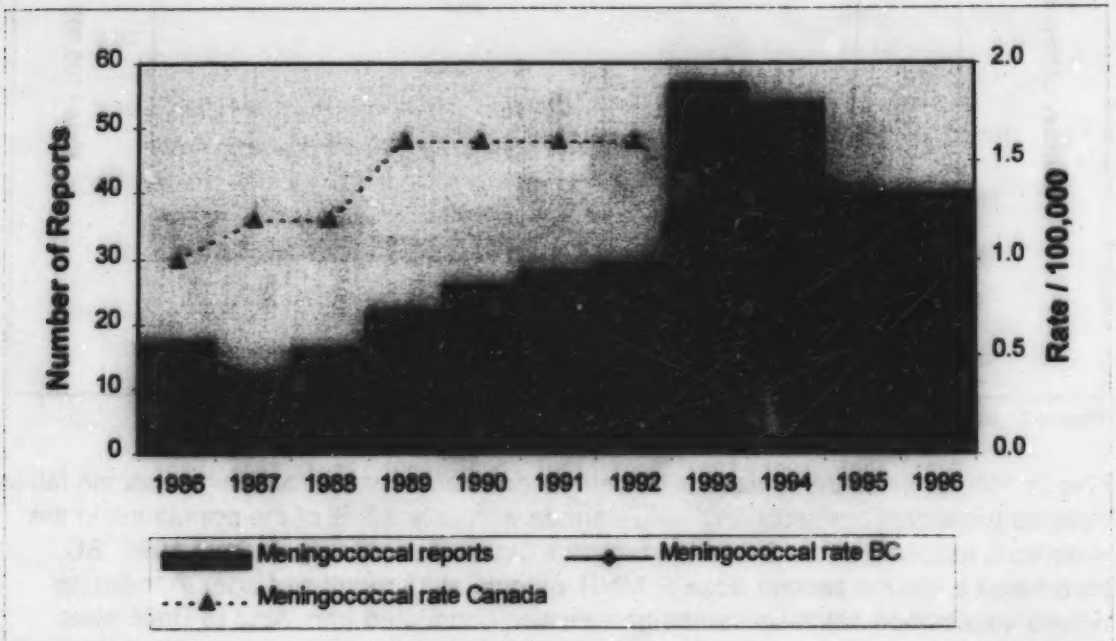


Figure 1. Reported Invasive Meningococcal Disease, BC, 1986-96.

Examination of the reported cases and rates by age group indicates that the highest rate of reported disease occurred in children under age one year in 1996. The rate was zero in the 10-14 year-old age group and then rose slightly in the 15-19 year-old age group. Rates then fell again in adults to less than one per 100,000. Cases were reported from all age groups, ranging in age from 6 months to 79 years.

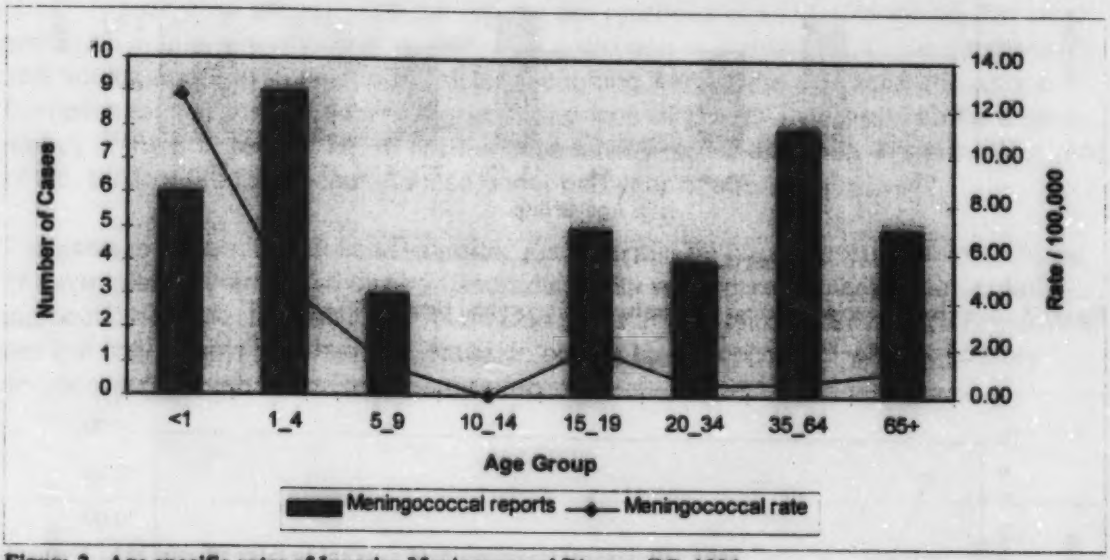


Figure 2. Age specific rates of Invasive Meningococcal Disease, BC, 1996.

There are 13 serogroups of *Neisseria meningitidis*, the ones which most commonly cause disease are serogroups A, B, C, W-135 and Y. Serogroups B and C are the most common in BC and Canada, with occasional cases of W-135 and Y reported. Over the last 10 years, there has been an increase in the proportion of serogroup C cases reported in BC and Canada relative to group B cases. Many experts consider disease caused by serogroup C to be different from that of other serogroups, particularly serogroup B disease. Group C disease is known to have a higher case-fatality rate; from 1991 to 1996 in BC, there were 111 reported cases of group C disease of whom 16 died (14.4%) compared to 115 reported cases caused by other serogroups or unknown serogroups of whom 4 died (3.5%). One of these four deaths occurred in a case with group Y disease and three in cases with group B disease. Examination of the 1996 rates of serogroup C compared to all others does show a difference in the age distribution. Peak rates of serogroup C infections occurred in the 1-4 and 15-19 year old age groups. Other serogroups had a peak rate in children under one year of age (5 were serogroup B and 1 serogroup Y in this group) with low rates evenly distributed across all other age groups. This confirms the epidemiology demonstrated in other jurisdictions that serogroup C disease, which tends to be more serious and have a higher case fatality than other serogroups, is more of a problem in children and adolescents while less severe group B disease is more of a problem in infants.

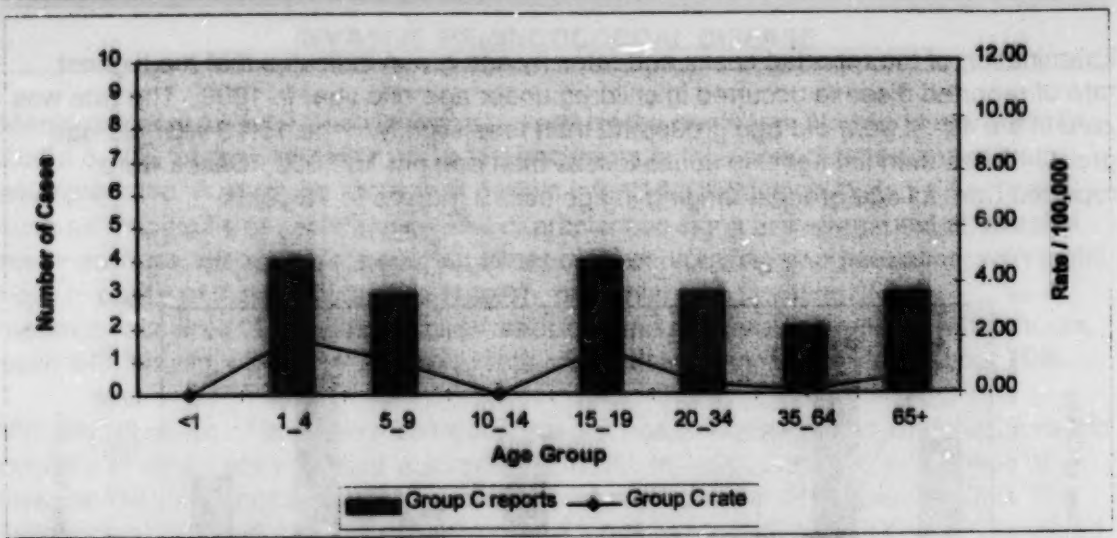


Figure 3. Age specific rates of Group C Invasive Meningococcal Disease, BC, 1996.

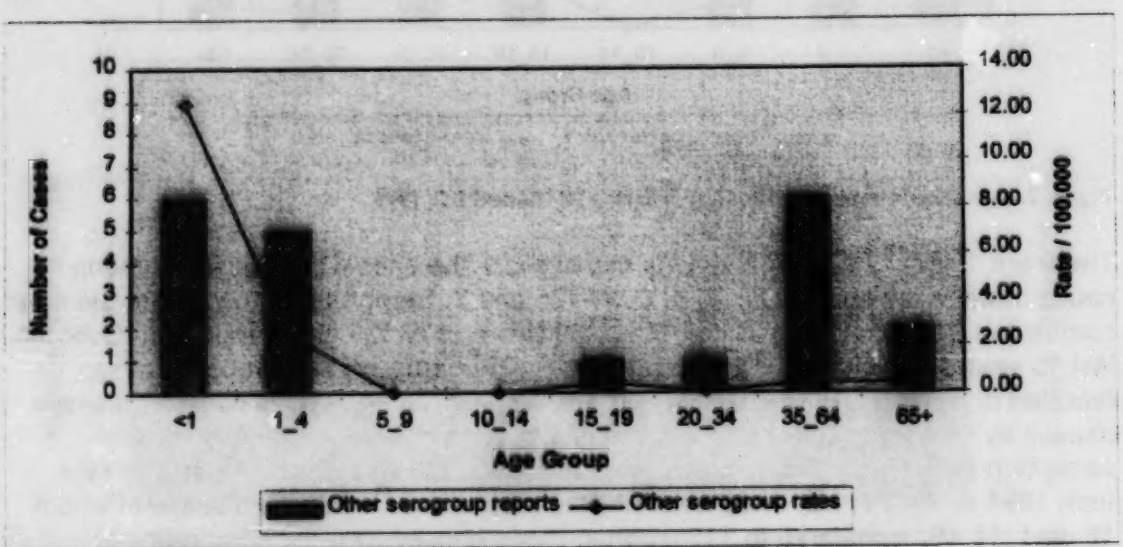


Figure 4. Age specific rates of other serogroups Invasive Meningococcal Disease, BC, 1996.

PERTUSSIS

Pertussis is a bacterial infection of the respiratory tract caused by *Bordetella pertussis*. It is characterized by gradual onset of mild upper respiratory tract symptoms (catarrhal stage) which typically last for 1-2 weeks before progressing to severe paroxysms of cough (paroxysmal stage). The paroxysms are episodes of severe coughing that often end in an inspiratory whoop or vomiting. The disease is usually atypical in adolescents and adults, and may consist of persistent coughing without the characteristic whoop. Complications include pneumonia, seizures, encephalopathy and death, and are seen mainly in the first year of life. While the case fatality rate is less than 1% in the first year of life, 80% of fatalities occur in those under one year of age.

Pertussis is endemic in British Columbia, and periodic outbreaks occur. Unimmunized or incompletely immunized children and adults with waning immunity are particularly susceptible to infection, although it can also occur in fully immunized children. Humans are the only known host, and transmission occurs by direct contact with respiratory secretions or by inhalation of airborne droplets.

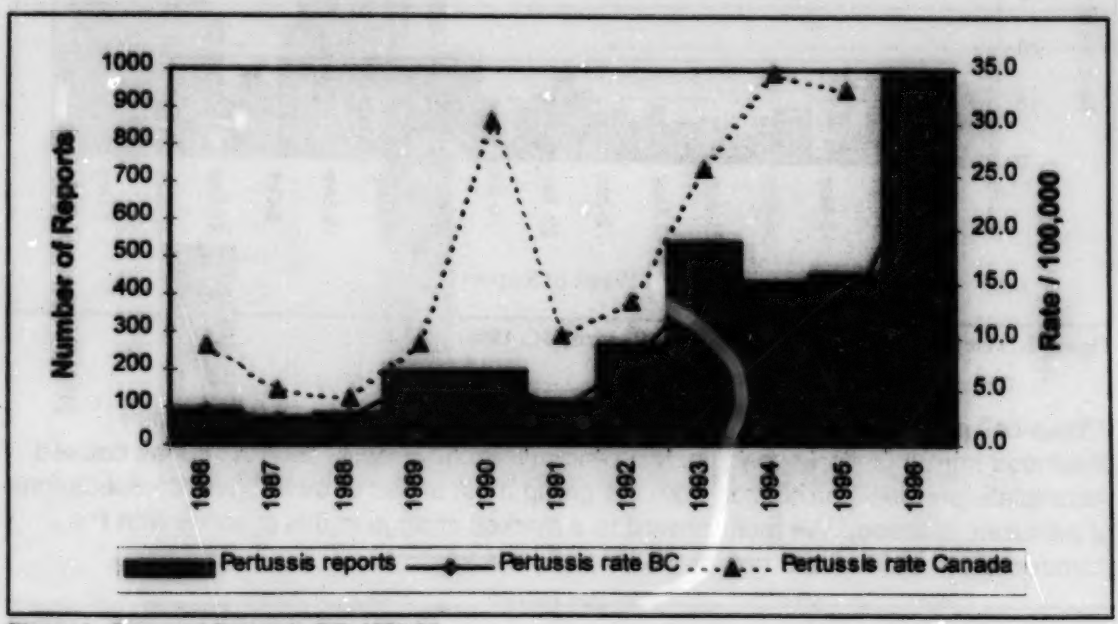


Figure 1. Reported Pertussis, BC, 1986-96.

There were 983 cases of pertussis reported in British Columbia in 1996 for a provincial rate of 25.5 cases per 100,000 people. This rate is more than double the 1995 rate of 11.3 cases per 100,000 people, representing a significant increase in reporting over the previous few years. Pertussis received significant media attention in 1996. Pertussis is under reported because of the difficulties in making a clinical diagnosis, particularly in atypical cases in the adult population and the reluctance of physicians to obtain nasopharyngeal specimens for testing.

The highest rates for reported pertussis disease started in early August to the first week of October, and then rose again in the first week of November. The rates remained high until the end of December.

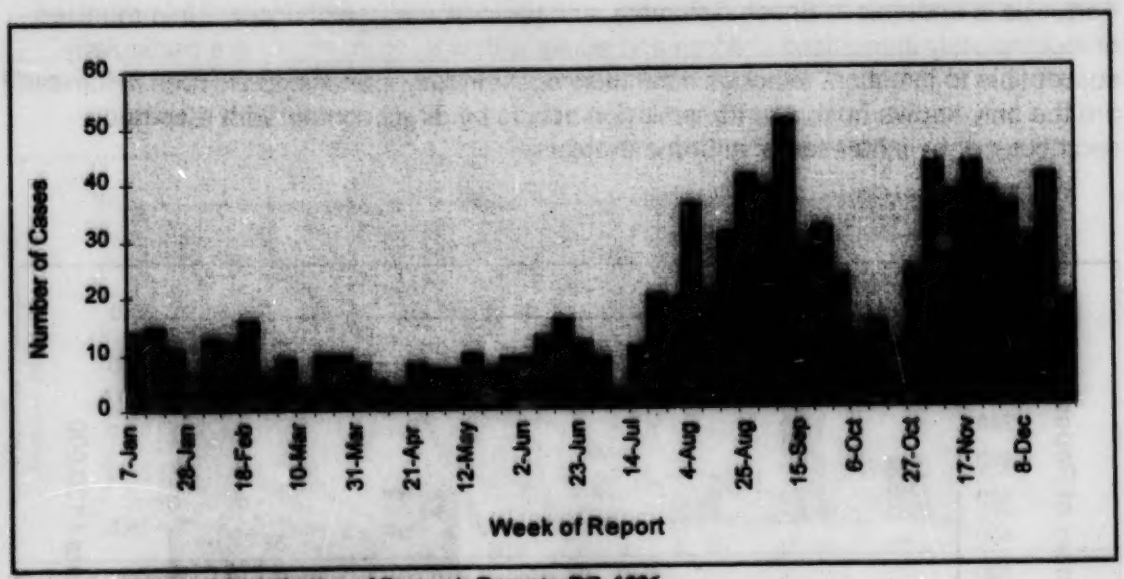


Figure 2. Temporal Distribution of Pertussis Reports, BC, 1996.

Whole-cell pertussis vaccine has been inappropriately deleted from the routine childhood immunization schedule, following certain adverse events. This has caused incomplete pertussis protection from the group most at risk of developing complications of pertussis disease. We look forward to a marked change in this practice with the introduction in 1997 of the new acellular pertussis vaccine.

RUBELLA

Rubella is a mild febrile viral disease characterized by an erythematous, maculopapular, discrete rash, generalized lymphadenopathy, and slight fever. Children usually experience few or no symptoms while adults can experience low grade fever, headache, malaise, mild coryza and conjunctivitis. Transient arthralgia and arthritis occasionally occur in late adolescence and adults especially females. Rubella is important because of its ability to produce anomalies in the developing fetus when mothers are infected during pregnancy. Congenital Rubella Syndrome (CRS) occurs in up to 90% of infants born to women who acquire confirmed rubella during the first trimester of pregnancy. Features of CRS include deafness, blindness, and neurological problems.

During 1996 there were 20 cases of rubella reported in British Columbia for a provincial rate of 0.5 case per 100,000 people. Provincial rubella reporting rates have remained low over the past 7 years following an outbreak in 1989 involving over 500 reported cases. Rubella vaccination was included as a vaccine component in the measles vaccination campaign conducted in 1996. During that campaign, over 85% of children from 1 year to 18 years old were immunized with measles/rubella vaccine.

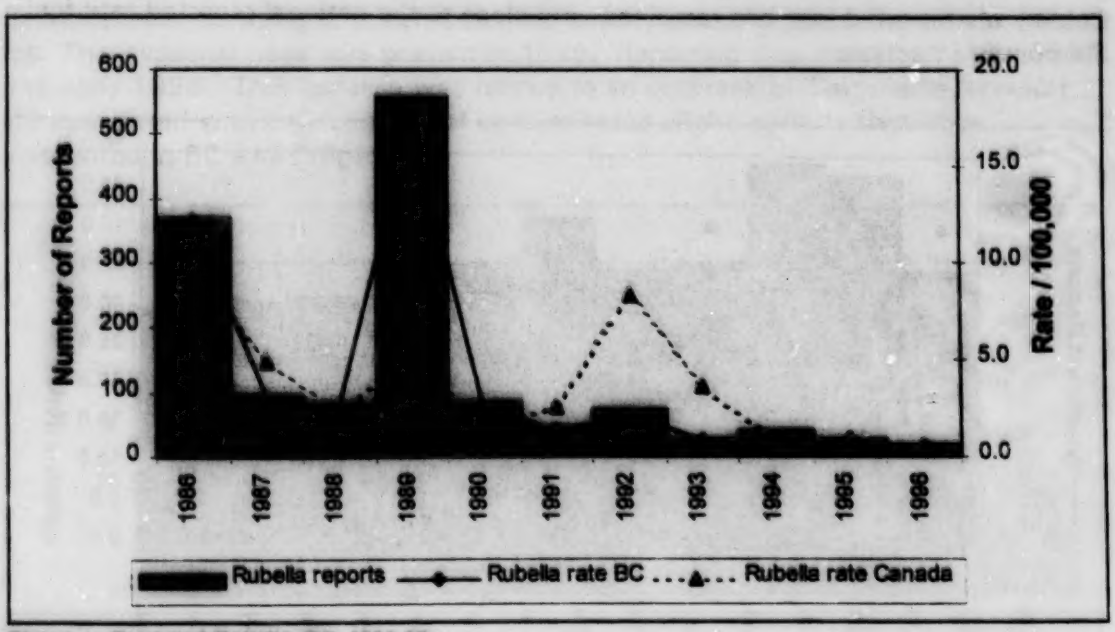


Figure 1. Reported Rubella, BC, 1986-96.

SALMONELLOSIS

Salmonella are bacteria that may cause illness in humans and other animals. In humans the disease is characterized by sudden onset of headache, fever, diarrhea, nausea, cramps, and sometimes vomiting. The incubation period is 6 to 72 hours, usually 12-36 hours. Communicability can last several days to weeks. Domestic pets are known to be susceptible, especially turtles, terrapins, chicks, dogs, and cats. Transmission between these pets and humans occurs frequently. Chronic carriers among the human population are rare, but are not uncommon among animals.

Salmonella infections are commonly acquired through ingestion of contaminated foods. Transmission can usually be attributed to raw or under cooked foods, or foods contaminated after cooking. *Salmonella* organisms may be shed in the stool for extended periods. Food workers shedding the bacteria may contaminate foods during preparation, resulting in outbreaks.

There were 839 reported cases of salmonellosis during 1996 in British Columbia. The provincial rate of salmonellosis was 22 reports per 100,000 population. The rate of salmonellosis reporting has been on the decline since the late 1980's. British Columbia's reported rate has remained very close to the national reported rate for *Salmonella* infection.

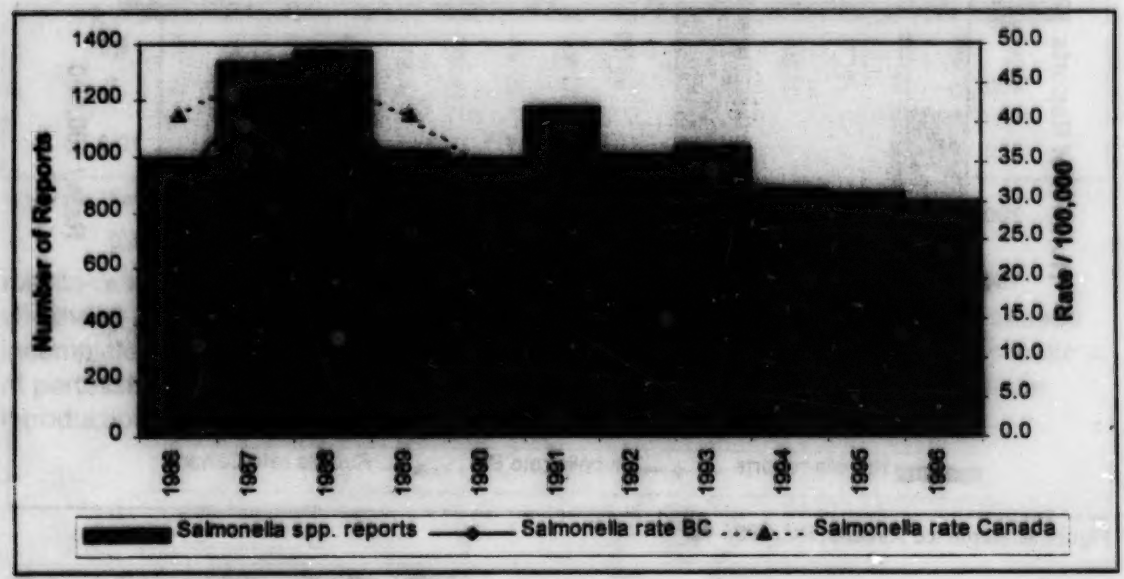


Figure 1. Reported Salmonella, BC, 1986-96.

Across the Province, reported rates for *Salmonella* infection were highest in Coast Garibaldi, Skeena, and the North Shore.

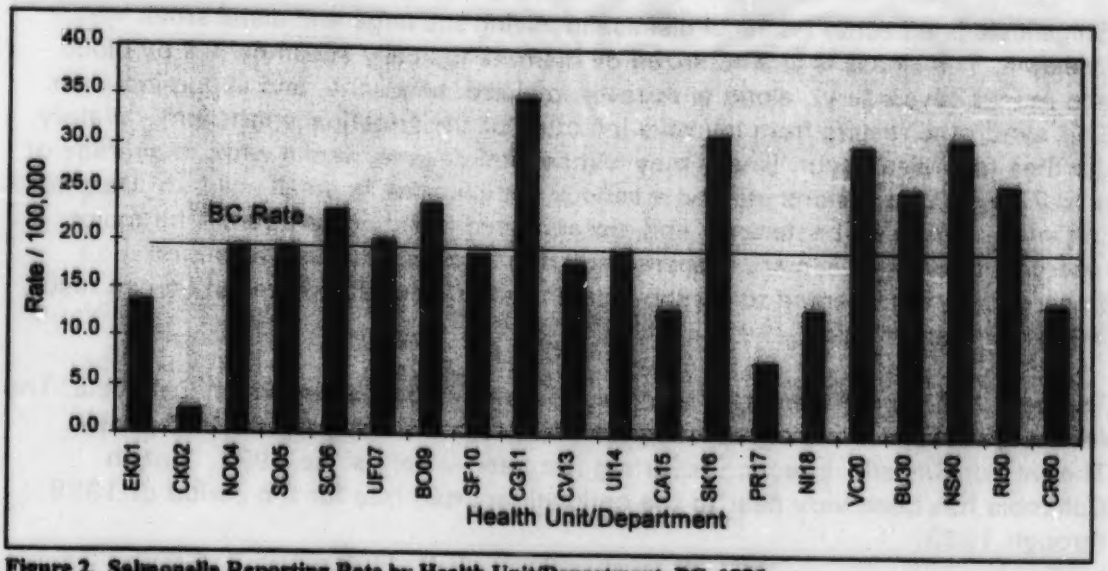


Figure 2. Salmonella Reporting Rate by Health Unit/Department, BC, 1996.

Salmonellosis reporting in British Columbia usually peaks in late summer and early fall. This seasonal peak was present in 1996. Reporting was also high in late 1995 and early 1996. This increase was related to an outbreak of *Salmonella* Newport C2 associated with consumption of contaminated alfalfa sprouts that were distributed in BC and Oregon.

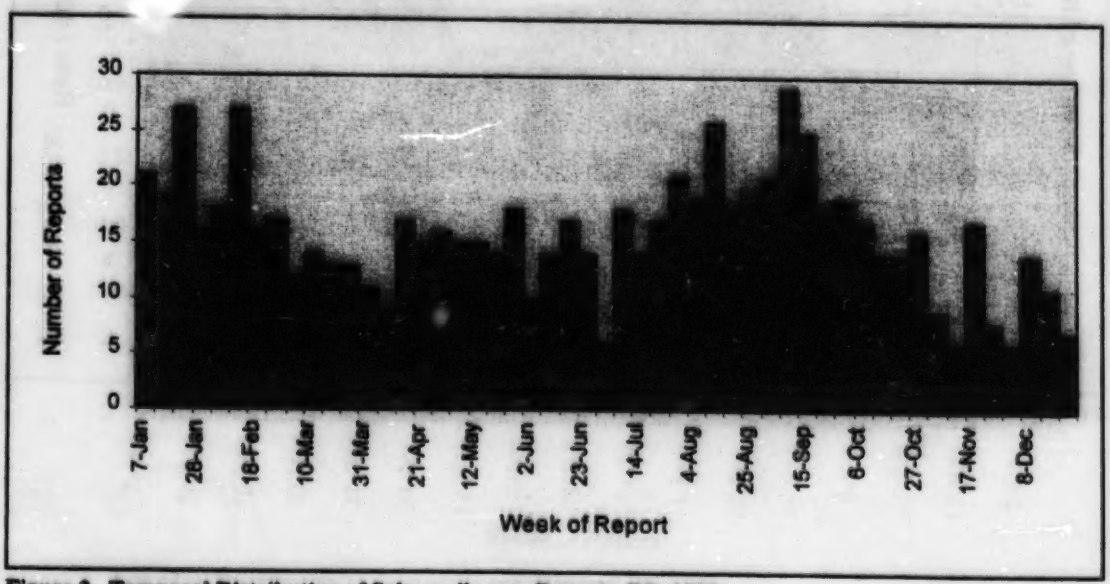


Figure 3. Temporal Distribution of Salmonella spp. Reports, BC, 1996.

SHIGELLOSIS

Shigellosis is an acute bacterial disease involving the large and distal small intestine. The illness is characterized by diarrhea typically accompanied by blood and mucus (dysentery), along with fever, malaise, headache, and abdominal pain. This syndrome results from invasive infection of the intestinal epithelium. Watery diarrhea may also occur. Illness may last several days to weeks with an average of 4 to 7 days. Convulsions may be a serious complication in small children. Despite the invasive nature, bacteremia and disseminated infections are rare. The major reservoir of *Shigella* is man. Transmission can be direct through fecal-oral transmission from person to person. Water and milk fecal contamination can result in indirect transmission.

Through 1996 there were 199 reported cases of shigellosis in British Columbia. The resulting Provincial rate of reporting for 1996 was 5 cases per 100,000 people. The rate of *Shigella* infection reporting has been steady since 1992. British Columbia has been very near to the national reported rate for the period of 1989 through 1993.

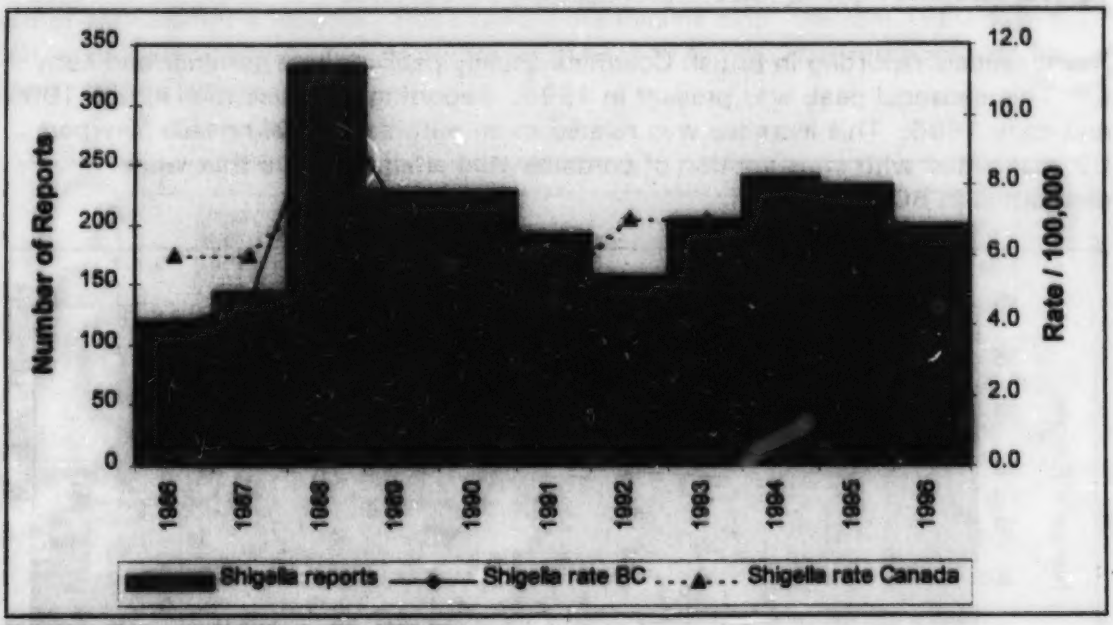


Figure 1. Reported Shigellosis, BC, 1986-96.

Central Kootenay had the highest reported rate at nearly 13.6 cases per 100,000 people.

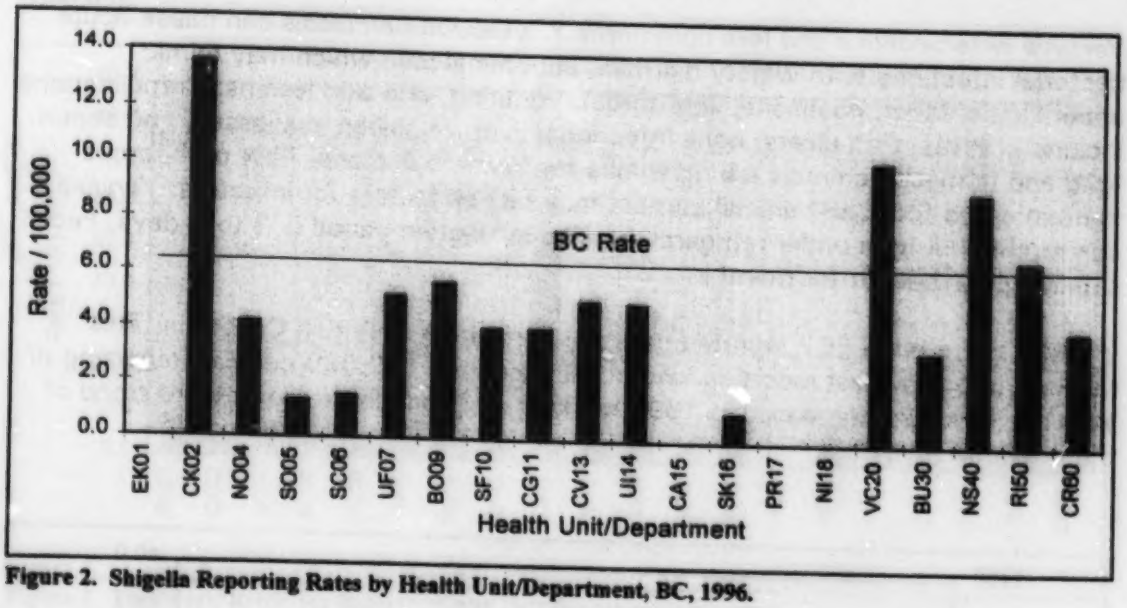


Figure 2. Shigella Reporting Rates by Health Unit/Department, BC, 1996.

Little seasonal variation is evident in the reporting distribution of *Shigella*. Some increased reporting was noted in the early spring and late summer.

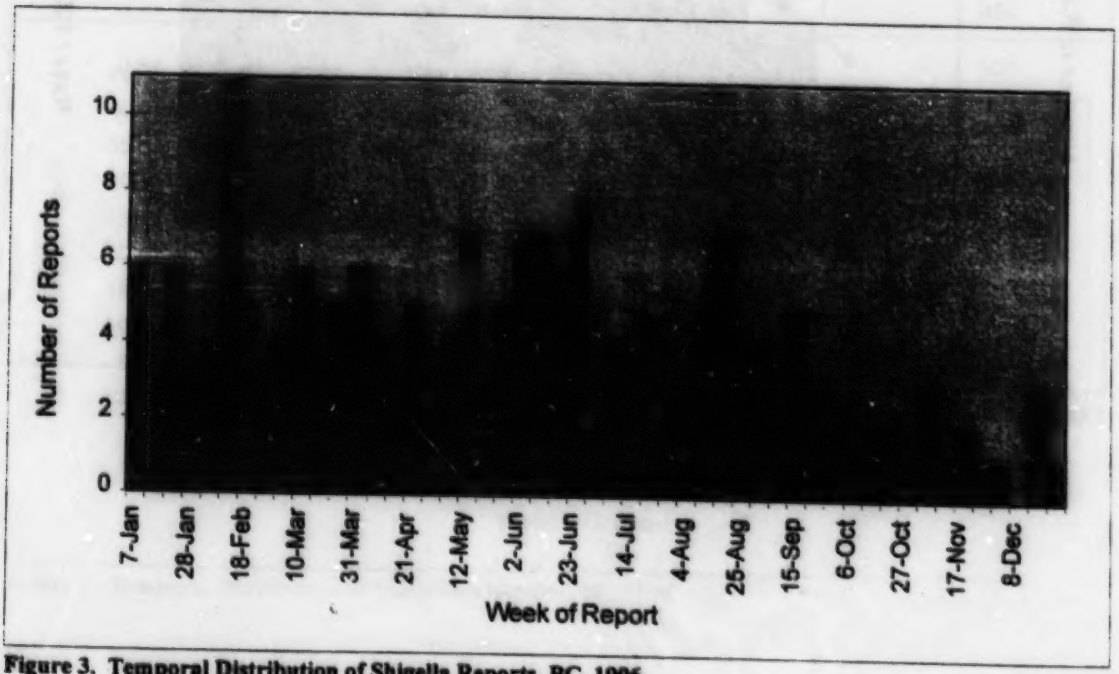


Figure 3. Temporal Distribution of Shigella Reports, BC, 1996.

YERSINIOSIS

Yersinia enterocolitica and less commonly *Y. pseudotuberculosis* can cause acute bacterial infections with watery diarrhea, abdominal pain which may mimic appendicitis, fever, headache, sore throat, vomiting, and skin lesions. Complications include arthritis, skin ulcers, bone infections, liver, or spleen abscesses, and sepsis. Wild and domestic animals are reservoirs for *Yersinia* bacteria. Raw pork, cross contaminated food, and animal contact may be risk factors for infection. *Yersinia* can multiply in food under refrigeration. The incubation period is 3 to 7 days. Fecal shedding can persist for months.

In 1996 there were 907 reported cases of yersiniosis in British Columbia. This resulted in a provincal reporting rate of 23 cases per 100,000 people. Reporting of *Yersinia* infections increased in 1995 marking a change in the downward trend of the previous 3 years.

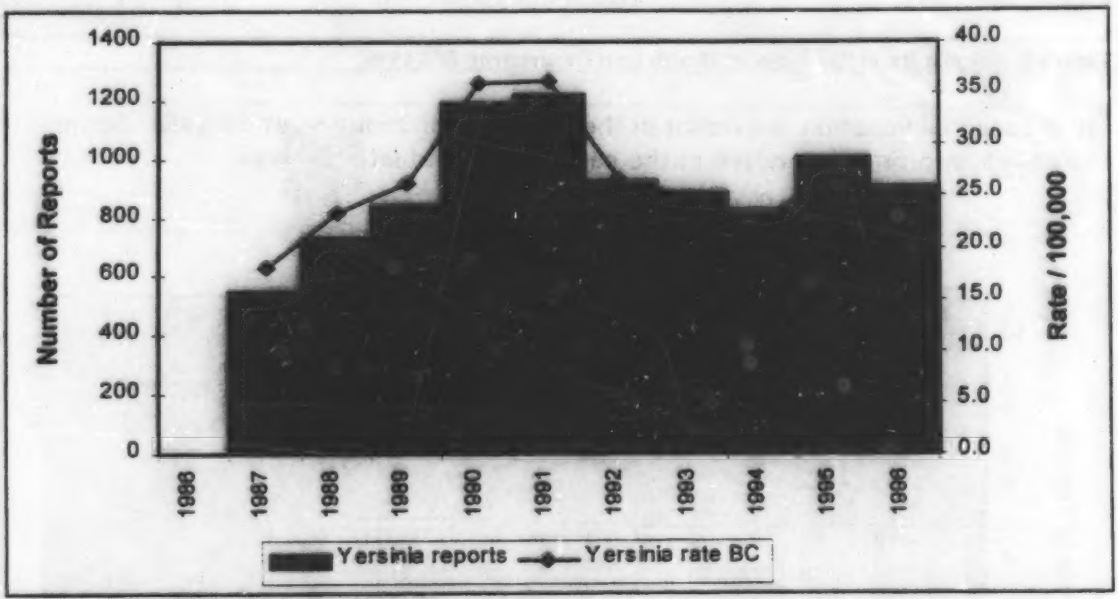


Figure 1. Reported Yersinia, BC, 1986-96.

North Shore, Vancouver, Richmond and Coast Garibaldi had the highest rates of yersiniosis reported in 1996. These areas far exceeded the provincial rate of reporting.

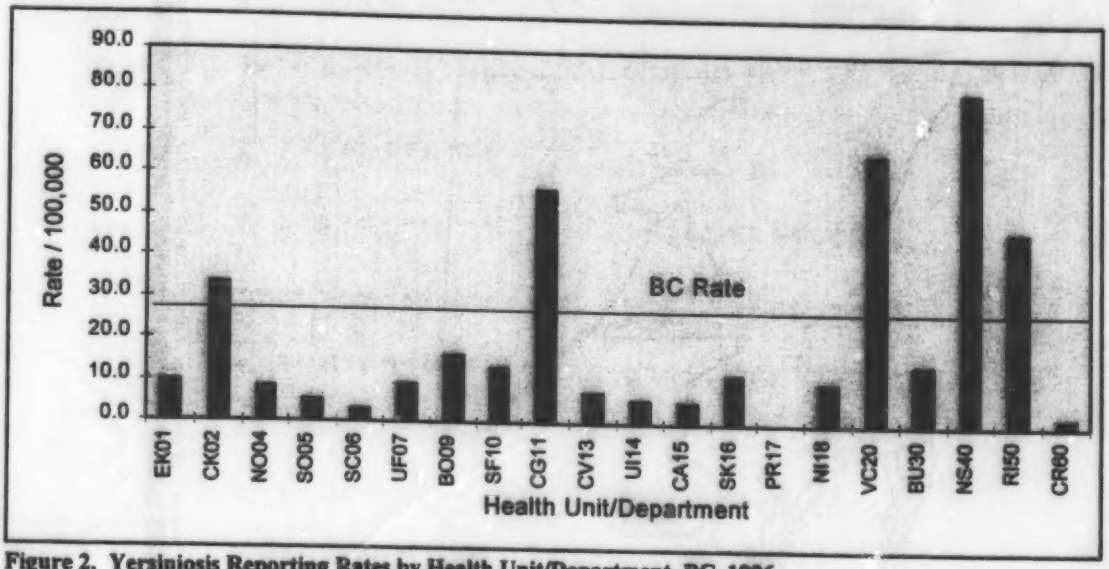


Figure 2. Yersiniosis Reporting Rates by Health Unit/Department, BC, 1996.

Yersinia reports show some seasonal variability with increased reporting through the summer months.

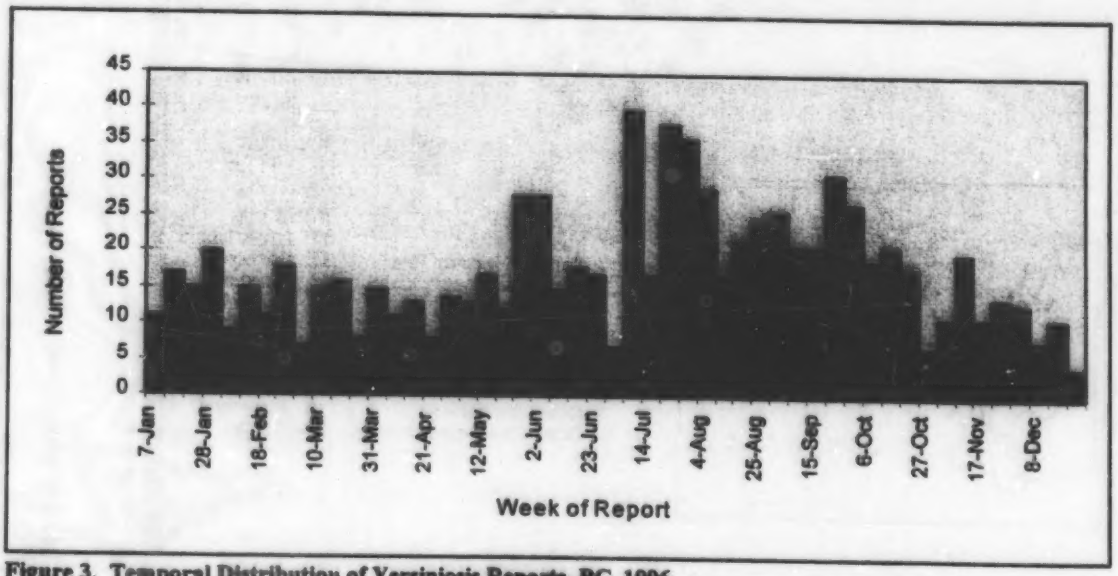


Figure 3. Temporal Distribution of Yersiniosis Reports, BC, 1996.

Appendix A:
British Columbia Health Units

1. East Kootenay
2. Central Kootenay
3. North Okanagan
4. South Okanagan
5. South Central
6. Upper Fraser Valley
7. Boundary
8. Simon Fraser
9. Coast Garibaldi
10. Central Vancouver Island
11. Upper Island
12. Cariboo
13. Skeena
14. Peace River
15. Northern Interior
16. Vancouver
17. Burnaby
18. North Shore
19. Richmond
20. Capital

Source: British Columbia Centre for Disease Control Society

APPENDIX B
Selected Disease Rates by Health Region - BC, 1996

	Health Region																				
1996 Population	60,105	61,083	120,069	221,377	128,707	229,347	525,449	297,128	73,939	238,924	119,611	75,589	62,863	64,575	128,567	543,084	178,922	173,949	149,311	324,517	3,898,140
Disease Reports																					
Campylobacter reports	44	46	66	113	62	215	367	169	36	146	70	24	47	14	36	517	109	158	121	251	2,631
E. coli O157:H7 reports	4	3	13	11	6	16	12	10	6	7	2	1	1	2	2	10	9	11	0	10	139
Giardia reports	14	29	43	42	47	80	203	80	30	71	35	12	33	13	34	315	33	66	21	100	1,310
Hepatitis A reports	3	2	7	12	2	41	63	39	13	89	11	1	6	1	4	134	20	19	13	39	499
Salmonella spp. reports	11	2	23	42	30	46	126	96	26	42	23	10	29	5	17	165	46	54	39	47	839
Shigella reports	0	11	5	3	2	12	30	12	3	12	6	0	1	0	0	56	6	16	10	14	199
Yersinia reports	6	27	10	12	4	21	67	49	42	18	7	4	11	0	13	389	26	141	70	7	937
Amebiasis reports	0	0	0	0	1	13	43	10	6	2	23	0	6	0	0	220	14	37	6	34	417
Meningitis:bact reports	0	0	0	0	0	0	1	1	0	2	2	1	1	0	2	6	2	1	0	0	21
Cryptosporidiosis reports	40	47	135	389	152	52	105	64	13	40	25	11	28	3	38	66	21	15	16	39	1,294
Hib reports	1	1	2	1	0	2	0	2	0	2	0	0	0	0	1	0	0	0	0	0	12
Rotavirus reports	4	0	0	0	14	2	37	19	11	41	0	3	3	1	1	94	3	0	7	44	284
Hepatitis B: Acute	1	2	11	12	3	11	30	17	0	5	19	0	11	10	8	96	12	0	3	14	256
Hepatitis B: Carrier	0	5	13	8	11	39	175	169	1	16	15	0	5	2	9	1,114	253	25	66	82	2,013
Hepatitis B: Undetermined	2	1	61	11	5	2	35	20	11	33	0	1	2	0	3	497	20	60	302	39	1,682
Hepatitis B reports	3	8	85	32	19	52	240	206	12	56	34	1	18	12	20	1,677	285	85	423	82	3,949
Malaria reports	2	1	0	1	1	45	193	7	3	3	0	0	1	0	1	57	8	9	11	9	349
Disease Rate/100,000																					
Campylobacter rate	54.9	55.5	54.1	51.0	47.8	93.7	69.8	63.8	48.7	62.5	58.5	31.8	50.7	21.7	29.5	95.2	60.9	89.7	81.0	76.0	66.2
E. coli O157:H7 rate	5.0	3.7	10.8	5.0	4.6	7.8	2.3	3.4	8.1	3.0	1.7	1.3	1.1	3.1	1.6	1.8	5.0	6.3	0.0	3.0	3.6
Giardia rate	17.5	35.6	35.9	19.0	36.2	34.9	38.6	26.9	52.7	30.0	29.3	15.9	35.6	20.1	26.4	58.0	18.4	37.9	14.2	29.9	24.9
Hepatitis A rate	3.7	2.5	5.8	5.4	1.5	17.9	12.0	13.1	17.6	24.5	9.2	1.3	6.0	1.5	3.1	24.7	11.2	10.8	8.8	11.7	12.7
Salmonella rate	13.7	2.5	19.2	19.0	23.1	20.1	24.0	16.8	35.2	17.7	19.2	13.2	31.3	7.7	13.2	30.4	25.7	31.0	26.3	14.0	21.9
Shigella rate	0.0	13.6	4.2	1.4	1.5	5.2	5.7	4.0	4.1	5.1	5.0	0.0	1.1	0.0	0.0	10.3	3.4	9.2	6.7	4.3	5.2
Yersinia rate	10.0	33.3	8.3	5.4	3.1	9.2	16.6	13.5	56.8	7.6	5.9	5.3	11.9	0.0	10.1	66.1	14.6	81.1	47.2	2.1	28.5
Amebiasis rate	0.0	0.0	0.0	0.0	0.8	5.7	8.2	3.4	8.1	0.8	19.2	0.0	6.5	0.0	0.0	40.5	7.8	21.3	5.4	10.2	10.8
Meningitis:bact rate	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.0	0.8	1.7	1.3	1.1	0.0	1.6	1.5	1.1	0.6	0.0	0.0	0.5
Cryptosporidiosis rate	49.9	58.0	112.4	175.7	117.1	22.7	20.0	21.5	17.6	16.9	20.9	14.6	28.1	4.6	29.5	12.2	11.7	8.6	10.9	10.8	33.2
Hib rate	1.2	1.2	1.7	0.5	0.0	0.9	0.0	0.7	0.0	0.8	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.3
Rotavirus rate	5.0	0.0	0.0	0.0	10.9	0.9	7.0	6.4	14.9	17.3	0.0	4.0	3.2	1.5	0.9	17.3	1.7	0.0	4.7	13.2	7.4
Hepatitis B rate	3.7	9.9	70.8	14.5	14.6	22.7	45.7	69.3	16.2	23.6	28.4	1.3	18.4	18.6	15.6	308.8	156.3	48.9	271.7	27.5	86.6
Malaria rate	2.5	1.2	0.0	0.5	0.8	19.6	36.7	2.4	4.1	1.3	0.0	0.0	1.1	0.0	0.8	10.5	4.5	3.4	7.4	2.7	9.1

OTHER SPECIAL INITIATIVES

THE 1996 MEASLES-RUBELLA CATCH-UP CAMPAIGN IN B.C.

A measles elimination program was implemented in B.C. in April 1996. One component of the program was the addition of a routine second dose of Measles-Mumps-Rubella (MMR) vaccine to the provincial immunization schedule for children at 18 months of age. The other component of the program was the implementation of a catch-up immunization campaign for those individuals 19 months to 18 years of age. A combination Measles-Rubella (MR) vaccine was used in the catch-up component, as it was known that approximately 10% of B.C. women screened prenatally for rubella are not immune.

An Implementation Group planned the logistics of the campaign, and developed the program support materials. This group was comprised of field level Public Health Nurses, Medical Health Officers, and consultants from Communicable Disease Epidemiology Services, B.C. Centre for Disease Control, and Public Health Nursing, Central Office.

The program was delivered by auxiliary nursing staff hired specifically for the campaign, in addition to regular public health nursing staff. Immunizations were given in schools and community settings.

Table 1 summarizes the immunization coverage levels. The lower coverage level in the preschool population reflects the difficulties accessing this group, as compared to the "in school" population.

Table 1: Immunization Coverage

Age Group	Number Targeted	Number Immunized	Percent Coverage
Preschool	173,687	130,093	74.9%
School age Grades K - 12	639,335	573,757	89.7%
Provincial Total	813,022	703,850	86.6%

Vaccine administration time per injection was recorded. This included all aspects of the nursing services required for vaccine administration (i.e. local publicity, staff training, coordination of school clinics, ensuring consent was obtained, travel, clinic set-up and clean-up, vaccination, recording of information, management and reporting of adverse events following immunization, and answering of telephone enquiries). Mean nursing time per dose was 13.5 minutes.

Data on adverse events was collected by public health nurses using the standard provincial reporting form. Table 2 summarizes this data. The pattern of reported adverse events is similar to that which is routinely reported for recipients of MMR vaccine.

Table 2: Adverse Events

ADVERSE EVENT	FREQUENCY	RATE (per 100,000 vaccinees)
Measles-like illness	177	25.5
Local reaction	73	10.5
Allergic reaction*	81	11.7
Joint pain or swelling	9	1.3
Thrombocytopenia	1	0.1
Other, non-specific	121	17.4
TOTAL	462	66.6

* Including one suspect anaphylaxis.

RECOMMENDATIONS:

- Preschool coverage was found to be very low at the mid-point of the campaign. A special promotional campaign was required late in May 1996 to improve coverage in this group.
  - ➔ Coverage should be monitored while a mass campaign is in progress in order to take action for groups with lower coverage.

- The B.C. Infants Act (legislation permitting mature minors to give their own consent) was inconsistently used. This may have influenced coverage and nursing time per dose in that it was found to be more expedient to obtain mature minor consent.
  - ➔ Wherever possible, informed consent should be obtained from the "mature minor" student.

- Insufficient resources were allocated for advertising and promoting the campaign.
  - ➔ Advertising resources must be sufficient to promote the campaign to the target population and to multi-cultural groups.

- Some staff expressed feelings of being overwhelmed with the demands of the campaign, which were in addition to their regular workload.
  - ➔ Staff must be supported and given direction from supervisors in prioritizing existing workload.

- Some staff expressed difficulty in adapting their standards of practise from a routine immunization program to a mass immunization campaign.
  - ➔ Prior to the onset of the campaign, dialogue is needed regarding the objectives and goals of a mass immunization campaign as opposed to those of routine immunization programs; for example, this may include not keeping client records, and not pursuing children who missed scheduled clinics.

- Questioning of the Implementation Group's decisions by management staff took up valuable time at the beginning of the campaign.
  - ➔ The Provincial Implementation Group must be given greater authority for decision-making in planning such a campaign.